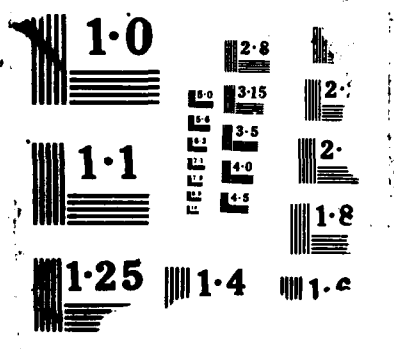


UNCLASSIFIED

BUILDINGS AT US A. (U) CONSTRUCTION ENGINEERING  
RESEARCH LAB (ARMY) CHAMPAIGN IL D REED ET AL. APR 88  
CERL-TR-N-88/06 F/G 15/5

1/2

NL





US Army Corps  
of Engineers

Construction Engineering  
Research Laboratory

USA-CERL TECHNICAL REPORT N-88/06  
April 1988

AD-A194 989

# Evaluation and Guidelines for the Use of Temporary Wood Buildings at U.S. Army Installations

by

David Reed  
John Fittipaldi  
Kevin Kennan  
Peter Murphy  
Paul Skidmore

A large number of temporary wood buildings (TWBs) were rapidly constructed on U.S. Army installations during World War II to satisfy the immediate demand for barracks, offices, and hospitals. The intention was to demolish the TWBs soon after the war when they were no longer needed. However, many TWBs still exist today and their use needs to be evaluated in light of current space requirements, construction standards, and servicing technologies.

A methodology for evaluating TWBs was developed and tested at three U.S. Army installations. Preliminary solutions to problems and issues raised by the evaluations were developed and incorporated into the planning and design guidelines presented in this report. The guidelines are proposed for use by policy level personnel, by the users of the proposed upgraded facilities, and by the professional staff responsible for the upgrading.

DTIC  
ELECTE  
S JUN 01 1988 D  
CO  
H

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official indorsement or approval of the use of such commercial products. The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

***DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED  
DO NOT RETURN IT TO THE ORIGINATOR***

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

ADA194989

## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No 0704 0188  
Exp Date Jun 30 1986

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b RESTRICTIVE MARKINGS		
2a SECURITY CLASSIFICATION AUTHORITY			3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.		
2b DECLASSIFICATION/DOWNGRADING SCHEDULE					
4 PERFORMING ORGANIZATION REPORT NUMBER(S) USA-CERL TR N-88/06			5 MONITORING ORGANIZATION REPORT NUMBER(S)		
6a NAME OF PERFORMING ORGANIZATION U.S. Army Construction Engr Research Laboratory		6b OFFICE SYMBOL (if applicable) CECER-EN	7a NAME OF MONITORING ORGANIZATION		
6c ADDRESS (City, State, and ZIP Code) P.O. Box 4005 Champaign, IL 61820-1305			7b ADDRESS (City, State, and ZIP Code)		
8a NAME OF FUNDING, SPONSORING ORGANIZATION HQFORSCOM		8b OFFICE SYMBOL (if applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER HQFORSCOM, Master Planning Branch, IAO 30-86 Planning Design Evaluation and Guidelines		
8c ADDRESS (City, State, and ZIP Code) Master Planning Branch Fort McPherson, GA 30330			10 SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO	PROJECT NO	TASK NO
			WORK UNIT ACCESSION NO		
11 TITLE (Include Security Classification) Evaluation and Guidelines for the Use of Temporary Wood Buildings at U.S. Army Installations (Unclassified)					
12 PERSONAL AUTHOR(S) David Reed; John Fittipaldi; Kevin Kennan; Peter Murphy; Paul Skidmore					
13a TYPE OF REPORT Final		13b TIME COVERED FROM _____ TO _____		14 DATE OF REPORT (Year, Month, Day) April 1988	
				15 PAGE COUNT 124	
16 SUPPLEMENTARY NOTATION Copies are available from the National Technical Information Service Springfield, VA 22161					
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
13	13		temporary wood buildings evaluation		
			wood		
			buildings		
19 ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>A large number of temporary wood buildings (TWBs) were rapidly constructed on U.S. Army installations during World War II to satisfy the immediate demand for barracks, offices, and hospitals. The intention was to demolish the TWBs soon after the war when they were no longer needed. However, many TWBs still exist today and their use needs to be evaluated in light of current space requirements, construction standards, and servicing technologies.</p> <p>A methodology for evaluating TWBs was developed and tested at three U.S. Army installations. Preliminary solutions to problems and issues raised by the evaluations were developed and incorporated into the planning and design guidelines presented in this report. The guidelines are proposed for use by policy level personnel, by the users of the proposed upgraded facilities, and by the professional staff responsible for the upgrading.</p>					
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a NAME OF RESPONSIBLE INDIVIDUAL GLORIA WIENKE			22b TELEPHONE (Include Area Code) (217)352-6511 (ext 353)		22c OFFICE SYMBOL CECER-IMT

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted  
All other editions are obsoleteSECURITY CLASSIFICATION OF THIS PAGE  
UNCLASSIFIED

## FOREWORD

This investigation was performed for the Headquarters, U.S. Army Forces Command (HQFORSCOM), Master Planning Branch, under IAO 30-86, "Planning Design Evaluation and Guidelines." The HQFORSCOM Technical Monitor was Mr. James Carmody. The U.S. Army Construction Engineering Research Laboratory (USA-CERL) engaged the services of the Center for Architecture and Urban Planning Research at the University of Wisconsin-Milwaukee (UWM-CAUPR) and the University of Cincinnati School of Planning (UC-SP) under subcontract to the University of Wisconsin-Milwaukee.

The personnel from UWM-CAUPR directly involved in the study were: David Reed, Associate Professor of Architecture and Urban Planning; Gary T. Moore, Associate Professor of Architecture; and Kevin Kennan and Peter Murphy, Research Assistants.

The personnel from UC-SP directly involved in the study were: David Lee Smith, Professor of Architecture; Michael Romanos, Professor and Director of UC-SP; and David Prosperi, Associate Professor of Planning.

The personnel from USA-CERL Environmental Division (EN) involved in the study were: John J. Fittipaldi, Principal Investigator, and Paul R. Skidmore, Research Assistant. Dr. R. K. Jain is Chief of USA-CERL-EN. The Technical Editor was Gloria J. Wienke, Information Management Office.

COL Norman C. Hintz is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.



Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

## CONTENTS

	Page
DD FORM 1473	1
FOREWORD	3
LIST OF FIGURE AND TABLES	5
1 INTRODUCTION .....	7
Background	
Objective	
Approach	
Scope	
Mode of Technology Transfer	
2 DESIGN EVALUATION .....	10
Objectives	
Building Selection	
Evaluation Methodology	
Case Study Reports	
Evaluation Findings	
Positive Aspects of TWBs	
Negative Aspects of TWBs	
3 DESIGN GUIDELINES .....	14
Evaluation Study Observations	
Guideline Proposals	
Guideline Packages	
Policy Guidelines	
Program Guidelines	
Design and Construction Guidelines	
4 CONCLUSIONS AND RECOMMENDATIONS .....	33
Conclusions	
Recommendations	
APPENDIX A: Evaluation Case Study, Fort Lewis, WA	34
APPENDIX B: Evaluation Case Study, Fort Hood, TX	60
APPENDIX C: Evaluation Case Study, Fort Ord, CA	76
DISTRIBUTION	

## **FIGURE**

<b>Number</b>		<b>Page</b>
1	Location of TWB Evaluations	9

## **TABLES**

1	Planning and Design Guidelines Packages	15
2	Policy Guidelines Package	16
3	User Group General Package	17
4	User Group Barracks Package	18
5	User Group Administration Package	20
6	User Group General Support Package	21
7	User Group Access Package	22
8	User Group Outside Activities Package	23
9	User Group Service Package	24
10	User Group Package Space Requirements	25
11	User Group Activity Interrelationships Package	26
12	User Group Site Analysis Package	27
13	User Group Building Analysis Package	28
14	User Group Site Arrangement Package	29
15	Design and Engineering Package	30



# EVALUATION AND GUIDELINES FOR THE USE OF TEMPORARY WOOD BUILDINGS AT U.S. ARMY INSTALLATIONS

## 1 INTRODUCTION

### Background

During World War II, the rapid construction of a large number of temporary wooden buildings (TWBs) provided much needed accommodation on Army installations. These buildings were designed to satisfy the demand for barracks, administrative and office buildings, warehouses, service buildings, base facilities, chapels, hospitals, and other sheltered space. The TWBs were originally built as simple, utilitarian structures and were conceived to meet a temporary need. The intention was to demolish the buildings when they were no longer needed. However, contrary to this intention, an estimated 27,047<sup>1</sup> TWBs remain in use today. That they fulfill a critical purpose can be attributed to a number of factors:

- the TWBs provide significant space which can help meet the needs of the 1980s,
- the cost of replacing all the vintage buildings with new construction would be exorbitant,
- the construction standards and materials used in these buildings were extremely high.

Some of these buildings remain in use in their overall original condition and arrangement. Others have been substantially modified over the years. There is now a need to reassess the use of these buildings in light of changing needs for space, changing standards of quality of the built environment, and changing construction and servicing technologies.

It is not surprising that different policy attitudes toward the continued use of TWBs should exist. Viewpoints ranging from "all must be kept" to "all must be demolished as soon as possible" were expressed during the course of this study. One report set a target date of 1990 to complete the demolition of all TWBs. The Committee on Armed Service believes this is an unrealistic goal.<sup>2</sup> What these viewpoints highlight, however, is the need to reassess the role these buildings play. If they are to continue to serve a useful purpose, attention to the structure, the organization of uses, and the site design and configuration is essential. Environmental planning and aesthetics must also be considered because of the visual image TWBs project to Army customers and the adjacent civilian community.

<sup>1</sup>Military Construction Appropriations for 1985, Hearings Before Subcommittee of the Committee on Appropriations, House of Representatives, part 4, p 16, Tuesday, February 28, 1984.

<sup>2</sup>Report of the Committee on Armed Service, Report No. 97-440, submitted by Senator Strom Thurmond to the 97th Session (2nd Session) of the U.S. Congress, Legislative day May 25, 1982.

The critical questions to be answered are: Can TWBs be adapted to the space needs of the 1980s and 1990s? Can they be upgraded at reasonable cost in relation to the cost of new construction? Can they provide standards of accommodation comparable to new buildings?

This project is one of two dealing with TWBs. The other related project discusses the real cost of temporary wood frame buildings<sup>3</sup> and is being conducted concurrently under contracts managed by the U.S. Army Construction Engineering Research Laboratory (USA-CERL).

The objective of the real cost study is to analyze the economic feasibility of retaining and upgrading World War II era temporary wooden buildings versus demolishing and replacing them with modern structures. Although the studies have separate objectives, this study relies on the findings in the real cost study to answer some basic questions concerning economic feasibility.

### **Objective**

The objective of this project is to develop guidelines for the evaluation and use of TWBs at U.S. Army installations.

### **Approach**

The project was undertaken in three phases:

1. Design Evaluation. The first phase of the study established a methodology for evaluating TWBs. The evaluation methodology was based on established techniques of Post Occupancy Evaluations (POEs) and was tested in a preliminary pilot study at Fort McCoy, WI. After refinement, evaluations were conducted at three U.S. Army installations: Fort Hood, TX; Fort Lewis, WA; and Fort Ord, CA (Figure 1).

The Fort Hood and Fort Lewis case studies were undertaken by a team from the Center for Architecture and Urban Planning Research, University of Wisconsin-Milwaukee. The Fort Ord case study was undertaken by a research team from the School of Planning, University of Cincinnati. Each of these Army installations has a very large inventory of TWBs.

2. Design Case Studies. The second phase of the study explored issues raised by the findings from each of the POEs and developed preliminary solutions to specific problems and issues at each installation.

3. Design Guidelines. The final phase of the study developed the design guidelines presented in Chapter 3.

---

<sup>3</sup>Peter V. Schaeffer, John J. Fittipaldi, and Paul Armstrong, *The Real Cost of Temporary Wood Frame Buildings*, Draft Technical Report (U.S. Army Construction Engineering Research Laboratory [USA-CERL], November 1987).

As the project proceeded, phases 2 and 3 became less distinct, and the guidelines were generated from the complex interplay between them. This resulted in a more precise direction of the nature of the guidelines once the critical problems and issues regarding upgrading the TWBs had emerged.

### **Scope**

Although the limitations of using only three study sites are considerable, the sites selected represent a range of climatic conditions. The three installations chosen also exhibited individually unique policy attitudes, management styles, and maintenance conditions, variable levels of earlier upgrading, and examples of different uses of these buildings. The scope of this study precluded an investigation of all possible uses of World War II era buildings under all use conditions. Two major building types were selected: barracks, and administrative and office buildings. Although the research looks in detail at these two specific building types, the approach suggested and the findings documented can be generalized to most other building uses.

### **Mode of Technology Transfer**

It is proposed that information in this report be distributed as an Engineer Technical Letter.



**Figure 1. Location of TWB evaluations.**

## **2 DESIGN EVALUATION**

### **Objectives**

The objectives of the POEs undertaken at the three installations were to:

1. Study site planning conditions related to World War II era buildings
2. Document the physical condition of the buildings
3. Analyze building services and building maintenance
4. Assess user satisfaction with the buildings.

### **Building Selection**

Although a substantial number of temporary wooden buildings were observed at each of the three study sites and at the pilot study site at Fort McCoy, only a limited number were studied in detail. At Forts Lewis and Hood, the initial evaluations detailed the use of the TWBs. A more wide-ranging evaluation of 23 structures at Fort Ord followed.

Based on this limited sample, the findings are not presumed to be specific to all conditions. However, they are generally reliable, they allow some initial conclusions to be drawn, and they provide an appropriate base upon which to develop the guidelines for future upgrading.

### **Evaluation Methodology**

Evaluation of the physical characteristics of the buildings was intended to be practical and brief to minimize interference with the day-to-day operation of the installation and the building users.

The evaluation was based on a combination of four techniques:

1. *Walkthroughs* consisted of an informal tour of the building with each group of users to record their observations and impressions of how the building suits their purposes, the particular merits of the building and grounds, and details that need further attention.
2. *Interviews* were conducted with personnel from all installation departments involved with both the day-to-day and long-term operations of the buildings. Construction and maintenance engineers, buildings and grounds staff, and administrative personnel were interviewed.
3. *User Group Surveys* were distributed to gain input from those users not involved in the walkthrough or interview portion of the evaluation.
4. *Physical Condition Surveys* were based on a checklist of building components including the roof, foundations, exterior walls and windows, interior walls and doorways, building surfaces, and building fixtures. In the Fort Lewis and Fort Hood evaluation

reports, this technique is referred to as a punchlist. The condition of each component was recorded and evaluated by the research teams.

### **Case Study Reports**

Detailed findings of the case studies are recorded in Appendix A for Fort Lewis, Appendix B for Fort Hood, and Appendix C for Fort Ord.

### **Evaluation Findings**

Findings of the evaluation studies have been grouped into four categories: the site, the physical condition of the buildings, the services, and user satisfaction.

#### *Site Conditions*

Although the general appearance of the installations could be improved by comprehensive landscaping programs, the only major site problem observed was inadequate parking. The available parking was often inconveniently located.

#### *Physical Condition of Buildings*

The majority of the existing TWBs are structurally sound. Many have undergone some type of upgrading during the past 40 years, although some have had no alterations other than minimal roof repairs. The upgrading work in the TWBs used as barracks generally consists of partitioning the open bays into single and double rooms. The rehabilitation work on one of the administrative buildings at Fort Hood was more extensive, and involved converting a mess hall into office space. These buildings are simple structures with many standardized parts. They are relatively simple to service and are no more difficult to maintain than similar building types constructed in more recent times.

The user evaluation assessment indicates that the level of satisfaction with the renovated building is closely related to the quality of materials used in any upgrading.

An example of a detailed survey of building conditions is included in Appendix C.

#### *Building Services*

Neither of the TWBs evaluated at Fort Lewis has had any extensive remodeling done to basic plumbing, heating, or electrical services. The decision to retain most of the original services inevitably compromised the rest of the work done on the buildings and the relative success of the restoration efforts. Most of the complaints about these two buildings were directly related to the plumbing, heating, and electrical systems. By contrast, the services in the Fort Hood building were completely replaced and the building is described as "problem free."

#### *User Satisfaction*

Building users can be classified as those who actually occupy the buildings and those who are responsible for maintaining and/or renovating them. People in the latter

group are often also included in the first group. Building evaluations by maintenance personnel tend to be more generalized than those of the occupants. However, the overlap is an important factor.

Of those that actually occupy the temporary wood buildings, two significant subgroups are apparent. One subgroup tends to be merely "receivers" of the structure; the typical occupants of the TWBs. The second subgroup tends to accept responsibility for the structure and to actively participate in improving conditions. This group may be designated "maintainers."

Generally, the receivers had more complaints about space conditions than the maintainers. This difference in attitude was not necessarily related to the observed quality of the structure, but to the level of responsibility for maintenance.

User evaluations were also obviously affected by comparisons with buildings of different vintages. From their unsolicited comments and from innuendo, it seems that TWB maintainers have a more positive appreciation for the buildings than more "permanent" building maintainers.

### **Positive Aspects of TWBs**

The positive aspects of TWBs noted by building users included the following:

- Space allocation tends to be more generous than in newer buildings.
- TWBs are often smaller and less formidable than newer buildings.
- TWBs offer better user control over lighting, heating, etc.
- Access to operable windows provided good daylighting, visual release, and beneficial cooling breezes.
- TWBs are aesthetically attractive when cleaned and painted.
- The buildings can be readily altered to accommodate a variety of activities.
- The interiors can be designed to meet most spatial demands.
- The condition of the buildings, when renovated and/or properly maintained, is comparable to or better than that of more permanent structures.

The positive aspects noted by maintainers included:

- The structural shells of the buildings are essentially sound and can accommodate considerable use, abuse, and modification.
- The buildings are very flexible.
- The one-story buildings with wood floors above grade are readily relocatable.
- The maintenance requirements of the buildings are relatively simple and do not require excessively specialized skills, equipment, or materials.

- The required amount of ongoing maintenance is comparable to that required by buildings of different vintages.

#### **Negative Aspects of TWBs**

The negative aspects of TWBs noted by the users included:

- The buildings are in poor condition.
- The buildings are old and not as nice as the newer buildings.
- The heating systems are not adequate, especially in terms of cold drafts along the floor and rooms with little or no heat.
- There are no toilet facilities or water access in many of the TWBs.

The negative aspects noted by maintainers included:

- Some of the buildings have deteriorated to a point where maintenance or renovation are no longer worthwhile.
- The buildings need to be painted on a regular basis.
- The buildings need more repair than newer buildings.

### **3 DESIGN GUIDELINES**

#### **Evaluation Study Observations**

The POEs undertaken at Forts Lewis, Hood, and Ord led to several key conclusions:

- These TWBs are generally in good shape and comprise an excellent stock of flexible structures which, when properly renovated, are a cost effective alternative to new construction.
- The expertise to properly renovate and maintain the TWBs is generally available on the installations.
- The failure to properly renovate these types of structures in the past has not been due to the lack of expertise but to their classification as temporary structures, thereby making them ineligible to receive adequate funding for a comprehensive renovation.
- For TWBs in which adequate funds have been invested, the renovations have been successful because existing utilities were replaced with modern, efficient systems and the building was viewed as a structural shell and was rebuilt using current construction technology.
- For TWBs in which the users' specific needs have been taken into account, the renovated buildings serve those needs in an optimal manner.

The keys, then, to the successful renovation of the TWBs are simple and straightforward: remove the temporary designation and provide adequate funding so a comprehensive upgrading strategy can be employed. This represents a change in policy rather than a change in design standards.

#### **Guideline Proposals**

In response to the evaluation findings, a series of design guidelines are proposed for use by policy level personnel, by the users of the proposed upgraded facilities, and by the professional design and engineering staff responsible for the upgrading. These guidelines are divided into three packages based on the group to which they are directed.

Starting with the assumption that there is the intention to consider upgrading the TWBs, the policy staff package suggests a revised policy attitude towards these buildings which basically calls for dropping the temporary classification and recognizes that these buildings represent a valuable alternative building resource. The user group package recognizes the critical input of design information from the people who will use the upgraded facility. The design and engineering professional staff package suggests ways of best achieving the design and technical components of the upgrading process.

Each package contains a series of tasks with accompanying notes and guidance, which, when completed, will give an overview of the upgrading process. The policy staff and the design and engineering staff should then be in a position to appraise the proposal for upgrading, both as a whole and in detail. If the proposal is found to be both feasible and viable, the project can then be implemented. If the proposal is found to be neither feasible nor viable, the guidelines can then be used to review and revise the proposal.



These guidelines are structured to allow an individual with little or no architectural or construction expertise to explore design alternatives effectively.

### Guideline Packages

Table 1 lists the packages and what the project initiators can expect to accomplish within each package. The tasks in the three packages are best carried out in sequence.

**Table 1**  
**Planning and Design Guidelines Packages**

Group	Package	Comments
U.S. Army Policy Staff	Policy Tasks 1-4	When this package is completed, there should be an understanding of the policy options for future accommodation needs that can be met by upgrading World War II era TWBs.
Users	Program Tasks 5-18	On completion of this package, a realistic building design program for upgrading World War II vintage TWBs should have been formulated.
Design and Engineering Professionals	Design and Construction Tasks 18-22	<p>After the tasks in this package have been carried out, upgraded accommodation responsive to user groups' needs will be available for occupation.</p> <p>The opportunity also exists at this stage for evaluating the upgraded building to obtain guidance for future projects.</p>

## **Policy Guidelines**

This package (Table 2) is designed to place the policy issues associated with upgrading World War II TWBs into perspective.

**Table 2**

### **Policy Guidelines Package**

---

#### **Task Number and Title**

---

1.   Reevaluate policy in light of economic viability study.
  2.   If evaluation study is favorable, remove temporary designation from these buildings.
  3.   Evaluate the level of funding available for upgrading.
  4.   Initiate policy of selected upgrading.
-

## Program Guidelines

This package (Tables 3 through 14) is designed to help building users assess the feasibility of upgrading TWBs. It will help users decide how best to fulfill their objectives and it provides guidance for preparing a building program.

**Table 3**  
**User Group General Package**

Task	Notes and Guidance
5. Name and describe the principal activity* intended for this new facility.	<p>Identify and record the principal activity/ies that are to be accommodated in this building.</p> <p>It is important to describe each activity as comprehensively as possible, briefly emphasizing any particular attributes of each use.</p> <p>If the activity identified is BARRACKS, go to Task 6.</p> <p>If the activity identified is OFFICE OR ADMINISTRATION, go to Task 8.</p>

\*Principal activities are the main activities of the proposed facility.

**Table 4**  
**User Group Barracks Package**

Task	Notes and Guidance
6. Determine the basic spatial requirements for barracks.	<p data-bbox="949 468 1361 590">The barracks may be planned with one, two, or three person rooms, or designed as open barracks.</p> <p data-bbox="949 625 1394 684">What room layout plans will best suit the needs of the user?</p> <p data-bbox="949 720 1400 871">Is there a need for a communal area or dayroom? If so, is it desirable to locate centrally in one building, or should there be a small dayroom in each building?</p> <p data-bbox="949 907 1389 995">What type of bathroom facilities are required (private, semi-private, or communal)?</p>
7. Name and describe secondary and support activities* generated by the activities identified in Task 1.	<p data-bbox="941 1060 1376 1148">Any discussion of storage needs should include consideration of the following:</p> <ul style="list-style-type: none"> <li data-bbox="941 1152 1379 1241">-Movable furnishings have the advantage of maximizing future flexibility.</li> <li data-bbox="941 1245 1339 1333">-Built-in furnishings have the advantage of utilizing space more efficiently.</li> <li data-bbox="941 1337 1389 1425">-Built-in storage against the hall wall can act as an acoustic barrier.</li> </ul> <p data-bbox="941 1461 1344 1583">Communal bathrooms should have private accommodations including individual shower stalls.</p> <p data-bbox="941 1619 1394 1680">What is the optimal number of sanitary fixtures for the facility?</p>

\*Secondary activities are other activities carried out in the facility along with, aside from, before, or after, the principal activity. These activities will include storage, cleaning, toilet activities, and communal activities.

**Table 4 (Cont'd)**

Task	Notes and Guidance
7. (cont'd)	<p data-bbox="996 407 1433 499">Is the allocation of sanitary fixtures adequate during periods of maximum usage?</p> <p data-bbox="996 531 1433 653">Is there the need for a common storage area for cleaning materials and/or personal possessions?</p> <p data-bbox="996 684 1306 709">Continue with Task 10.</p>

**Table 5**

**User Group Administration Package**

<b>Task</b>	<b>Notes and Guidance</b>
<b>8. Determine the basic layout for offices and administration.</b>	<p>How many different administrative functions will there be?</p> <p>What types of space requirements will each have?</p> <p>-If administration functions require frequent communication between people, an open bay layout will facilitate intraoffice communication.</p> <p>-Circulation in an open bay can, however, be disruptive. This can be improved with the addition of movable partitions which can increase visual and acoustic privacy.</p> <p>-If administrative personnel are dependent on clerical support, a design which integrates these adjacency requirements should be considered.</p> <p>What types of general support space will be required for each type of administrative function and what type of space requirement will each have?</p> <p>How much and what types of future space will be needed?</p>

**Table 6**

**User Group General Support Package**

<b>Task:</b>	<b>Notes and Guidance</b>
9. Name and describe secondary and support activities* generated by the activities identified in Task 8.	<p>For administration buildings, space may be needed for meeting, relaxing, providing snacks, storage, cleaning, toilets, etc.</p> <p>Legislation and regulation may impose certain requirements (e.g. the number of exits, number of toilet facilities, or the provision of facilities for the disabled).</p> <p>Will there be a need for specialized support facilities such as conference/meeting rooms, laboratories, reprographic rooms, etc.?</p> <p>Is there equipment which generates noise and/or heat? Should this equipment be isolated from the office environment? Are there future needs such as an increased need for computers, which require planning at this stage?</p>

\*Secondary activities are other activities carried out in the facility along with, aside from, before, or after, the principle activity.

**Table 7**  
**User Group Access Package**

<b>Task:</b>	<b>Notes and Guidance</b>
10. Identify access and egress requirements for the building.	<p>What connection is needed to the existing installation's circulation pattern for cars and people?</p> <p>Is adequate parking available adjacent to the building?</p> <p>What are the anticipated future parking needs?</p> <p>In addition to sidewalks along vehicular routes, are paved pedestrian connections between buildings desirable?</p> <p>Does the building need to be accessible to the handicapped?</p> <p>Is emergency or delivery access needed to particular parts of the building?</p> <p>Are there any special requirements associated with emergency egress from the building?</p>



**Table 8**

**User Group Outside Activities Package**

Task	Notes and Guidance
11. Identify the need for outside activities* adjacent to or near the building.	<p>Is there a need for an extension of indoor activities to the outside of the building? These activities may include:</p> <ul style="list-style-type: none"><li>-Eating or sitting areas. Is there a need for a shaded area for coffee or lunch breaks?</li><li>-Recreation areas. Would a black-topped area for basketball, volleyball, or other activities adjacent to the building be desirable?</li><li>-Space for trash/garbage disposal.</li></ul> <p>Where should the dumpster be located in relation to the building? The issues of health, aesthetics, convenience, and proximity to the building should be considered.</p>

\*Outside activities are essential activities that support or facilitate the principal use of the building.

**Table 9**  
**User Group Service Package**

Task	Notes and Guidance
12. Determine the need for electrical, lighting, sanitary, and other services required by the selected activity.	<p>Service requirements may include electricity, water, gas, heating, drainage, telephone, and other services.</p> <p>Are there requirements for particular services?</p> <p>Consideration should be given to the following:</p> <ul style="list-style-type: none"> <li>-Conduit for electrical and telephone connections provided along perimeter walls allows the maximum flexibility of layout.</li> <li>-Electrical outlets on all walls in rooms provides the maximum flexibility in placing of electrical equipment and appliances.</li> <li>-Should there be individual, zoned, or central control over heating/cooling?</li> <li>-Should there be provisions for TV antennae or cable hook-ups?</li> <li>-How many telephones are desirable and where should they be located?</li> <li>-If administrative functions require computer screens, indirect natural or artificial lighting may be preferred.</li> </ul>

**Table 10**

**User Group Package Space Requirements**

<b>Task</b>	<b>Notes and Guidance</b>
13. Define specific activity areas and/or volumes.	<p data-bbox="915 436 1377 495">List all activity areas identified in Tasks 5 through 12.</p> <p data-bbox="915 533 1394 840">For each activity, state: -the approximate area required. -specific dimensions if necessary, e.g., particular dimensional requirements or the dimensions of special pieces of equipment. -any special finishes or fittings for the activity. -any special service or structural implications.</p> <p data-bbox="915 877 1410 936">What are the current space allocation standards?</p> <p data-bbox="915 974 1344 1024">Are these standards adequate for current and future needs?</p>

**Table 11**

**User Group Activity Interrelationships Package**

<b>Task</b>	<b>Notes and Guidance</b>
14. Define important activity interrelationships.	<p>It is necessary to define inter-relationships so that spaces are arranged to fulfill specific needs.</p> <p>Consider which activities should be closer to, adjacent to, or associated with other activities.</p> <p>Consider which activities group together:</p> <ul style="list-style-type: none"><li>-list all activities.</li><li>-determine criteria for grouping.</li><li>-state reason for interrelationships.</li><li>-list interrelationships and grouped activities where possible.</li><li>-state priorities for specific relationships.</li></ul> <p>There are several ways of recording this information:</p> <ul style="list-style-type: none"><li>-representing the relationships diagrammatically provides visual help.</li><li>-activities or groups of activities can be linked in bubble diagrams and qualified by notes.</li><li>-the matrix is a simple way of showing relationships between activities.</li></ul>

**Table 12**

**User Group Site Analysis Package**

Task	Notes and Guidance
15. Carry out a site analysis of the area surrounding the building(s) proposed for rehabilitation.	<p data-bbox="918 436 1367 529">Describe the microclimate of the site (e.g., the sunpath, prevailing winds, noise sources, etc.).</p> <p data-bbox="918 562 1427 680">Is there a particular view which could be enhanced by appropriate use of landscaping or which should be screened by the use of landscaping?</p> <p data-bbox="918 714 1420 831">Can landscaping be used to unify a group of buildings so as to create a sense of continuity within the base or within parts of the base?</p> <p data-bbox="918 865 1384 957">Can landscaping be used to control environmental problems, such as excessive heat gain, winds, etc.?</p> <p data-bbox="918 991 1414 1108">Could planting and trees help to alleviate problems of the site such as barrenness, exposure, unwanted access, etc.</p> <p data-bbox="918 1142 1404 1260">It may be helpful for the user groups to describe ways that the proposed activities for the building could use the external areas of the site.</p>

**Table 13**

**User Group Building Analysis Package**

<b>Task</b>	<b>Notes and Guidance</b>
16. As you are using an existing building(s), determine the capacity and potential for conversion for the desired activities.	<p>Can the square footage needs be accommodated within one building?</p> <p>Will current square footage requirements be adequate for future needs?</p> <p>Are present space allocation standards adequate?</p> <p>It should be noted that:</p> <ul style="list-style-type: none"><li>-activities can be organized in one building, or several buildings can be connected and considered as one entity.</li><li>-buildings can be moved and rearranged to enclose a courtyard.</li></ul> <p>Which of these arrangements, or what alteration to the existing pattern, would best suit the needs?</p> <p>Assess the historical and/or architectural merit of the building and the importance of conserving its essential character.</p>

**Table 14**

**User Group Site Arrangement Package**

Task	Notes and Guidance
17. Determine site arrangement of building or buildings.	<p>One or more buildings can exist separately, or they can be joined together. Would one of these arrangements serve the needs better than the other?</p> <p>Buildings, whether separated or joined, can be moved and rearranged to enclose a courtyard which can act as a focal point. Would this be desirable?</p> <p>Site considerations such as prevailing winds, orientation with respect to the sun, view corridors, and soil and drainage, should be considered in determining whether or not the building could be moved.</p>

## Design and Construction Guidelines

This package (Table 15) presents, in a simplified form, the typical design process but highlights the particular questions and tasks that must be addressed to accomplish a successful upgrading project.

This package helps the professional staff assess the feasibility of the design, construction, and maintenance phases of the project. The package encourages the generation of alternative designs and helps to continue the dialogue between the design and construction professionals and the intended users of the project.

Table 15

### Design and Engineering Package

Task	Notes and Guidance
18. The comprehensive evaluation of the building and site by design and engineering professionals.	<p>Determine the building's structural capacity.</p> <p>Determine the building's constructional durability. Particular attention needs to be given to:</p> <ul style="list-style-type: none"><li>- foundations</li><li>- exterior walls</li><li>- roof</li><li>- interior walls</li><li>- ceilings</li><li>- floors</li><li>- windows</li><li>- doors</li><li>- building services.</li></ul> <p>Determine the condition of building services to the building. These services may include:</p> <ul style="list-style-type: none"><li>- electric lighting</li><li>- electrical service</li><li>- heating and air conditioning</li><li>- plumbing and drainage.</li></ul> <p>The evaluation should be aimed at determining the condition of the basic structural shell.</p>



Table 15 (Cont'd)

Task	Notes and Guidance
19. The design of the renovation using the new policy guidelines established by the policy package (Tasks 1 through 4) and the user generated design brief (Tasks 5 through 17).	<p>Three basic assumptions should be made when undertaking this task:</p> <ul style="list-style-type: none"> <li>-the buildings are generally in excellent structural condition.</li> <li>-the building will need considerable upgrading to bring it up to current standards.</li> <li>-the services will need to be totally replaced to meet current standards.</li> </ul>
20. Consult with user group representatives at intervals during the design process.	<p>In buildings in which the users' specific needs and viewpoints have been taken into consideration, the renovated buildings should serve these needs in the optimum manner.</p>
21. Estimate the capital cost of the upgrade, evaluate maintenance costs, and operating costs.	<p>An estimate of the capital cost of upgrading the building involves stating:</p> <ul style="list-style-type: none"> <li>-the estimated cost of the building based on the proposed design and condition of the original building.</li> <li>-the cost of providing equipment, finishings, and fittings.</li> </ul> <p>Are there future costs that can be anticipated at this stage and that should be part of the cost evaluation?</p> <p>What maintenance costs can be anticipated?</p> <p>At this stage it will be useful to compare this cost with the cost of a comparable new building.</p> <p>Is the project still viable?</p>

**Table 15 (Cont'd)**

<b>Task</b>	<b>Notes and Guidance</b>
22. Obtain any authorization needed and implement the construction program.	<p>After construction, you will have the opportunity to reassess some of the original assumptions.</p> <p>It would also be beneficial to conduct a postoccupancy evaluation of the upgraded building to determine how successful the project has been and to fine-tune future efforts.</p>

## **4 CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusions**

This study developed three guidelines packages for evaluating and using TWBs at U.S. Army installations. The policy guidelines package suggests removing the temporary designation from buildings if upgrading would be economically feasible, evaluating available funding, and initiating selected upgrading. The program guidelines package helps users identify their needs and decide how to best meet those needs through TWB upgrading. The package also provides information on preparing a building program. The design and construction guidelines package helps the professional staff evaluate the design, construction, and maintenance phases of the upgrading project.

The guidelines packages were used to evaluate TWBs at Forts Lewis, Hood, and Ord. Although different attitudes towards these buildings and their suitability for meeting future needs were expressed, the buildings are in excellent structural condition and, with suitable modification and renovation, can be used for many more years and provide U.S. Army installations with a valuable resource.

The attitude expressed by many people working in well renovated structures was that the accommodations were as good as, and often considerably better than, those found in more recently constructed buildings. This same attitude was also shared by people involved in maintaining upgraded World War II era TWBs.

### **Recommendations**

The study did not compare wood frame buildings of World War II era with other similar use buildings constructed later. This would be a valuable study to undertake and would be a natural extension of the present study.

Two areas should be considered for additional study. First, many activities besides barracks and administration are accommodated in TWBs and an assessment of the best future use for this building type would be advantageous. Second, some installations have substantial experience in the preferable renovation procedures and upgrading techniques. A more extensive review of this experience and the publication of case study examples would allow sharing of this knowledge.

## **APPENDIX A:**

### **EVALUATION CASE STUDY, FORT LEWIS, WA**

#### **CONTENTS**

	<b>Page</b>
<b>1.0 INTRODUCTION .....</b>	<b>36</b>
<b>2.0 PROCEDURE.....</b>	<b>38</b>
2.1 Evaluation Methodology	
2.2 Walkthroughs	
2.3 Interviews	
2.4 Surveys	
2.5 Punchlist	
<b>3.0 BACKGROUND: Fort Lewis.....</b>	<b>39</b>
3.1 Installation Data	
3.2 Building Information	
<b>4.0 EVALUATION DATA: Building 9E4.....</b>	<b>43</b>
4.1 Building and Site	
4.2 Communal Facilities	
4.3 Circulation	
4.4 Living Accommodations	
4.5 Sanitary	
<b>5.0 EVALUATION DATA: Building 9C26 .....</b>	<b>51</b>
5.1 Building and Site	
5.2 Communal Facilities	
5.3 Circulation	
5.4 Living Accommodations	
5.5 Sanitary	
<b>6.0 SUMMARY: Fort Lewis.....</b>	<b>58</b>
<b>7.0 CONCLUSIONS: Post Occupancy Evaluations .....</b>	<b>59</b>

## LIST OF FIGURES

Number		Page
1	Vicinity Map	39
2	Installation Map	40
3	North Fort Lewis Map	40
4	Typical Building Plan	41
5	Typical Building Elevation	41

## Design Evaluation: Fort Lewis

### 1.0 INTRODUCTION

This document has been produced as a working document during the first stage of a research project for the U.S. Army Construction Engineering Research Laboratory. The overall goal of the project is to develop a methodology for evaluating U.S. Army installation buildings constructed during the 1940s and for developing design guidelines for upgrading these buildings to meet today's requirements.

These World War II era buildings were designed and built to accommodate several uses. The buildings were designed as simple, utilitarian temporary structures. Although the intention was to demolish them when they were no longer needed, many of the buildings are still in use today and fulfill a significant need. Some remain largely in the condition that they were in when built, unmodified from their original plan. Others have, over the years, been substantially altered as expediency dictated. Both deterioration with time and, in some cases, the alterations made to their structures over the years, have often made these buildings aesthetically unpleasant.

An evaluation of these buildings was undertaken at three Army bases: Fort Lewis, Washington, Fort Hood, Texas, and Fort Ord, California, the latter study being performed by researchers at the University of Cincinnati School of Planning, as part of a sub-contract to the Center for Architecture and Urban Planning Research (CAUPR), University of Wisconsin-Milwaukee. The objectives of this evaluation were:

- \* to study site conditions.
- \* to document the physical condition of the buildings.
- \* to evaluate ease of maintenance.
- \* to analyze building services.
- \* to assess user satisfaction.

The Fort Lewis study involved a detailed evaluation of two buildings typical of their type: Buildings 9E4 and 9C26.

Stages 2 and 3 of this project will develop and present generic design guidelines for the evaluation and upgrading of these buildings.

## Design Evaluation: Fort Lewis

The purpose of the methodology being developed is to provide guidance to planners and architects for the upgrading of World War II era buildings to meet the needs of the 1980s and for the integration of these buildings into the overall planning needs of U.S. Army installations. A parallel study undertaken by the Department of Urban and Regional Planning, University of Illinois, Champaign/Urbana has investigated the economic feasibility of the upgrading of World War II era buildings.

## Design Evaluation: Fort Lewis

### 2.0 PROCEDURE

#### 2.1 Evaluation Methodology

The evaluation methodology is intended to be pragmatic and of short duration. This results in a minimal impact of the evaluation procedure on the day-to-day operation of the installation and the people using the particular building being investigated.

The methodology is based on a combination of four techniques with the greatest emphasis being placed on the walkthroughs.

#### 2.2 Walkthroughs

Walkthroughs consist of identifying users of the facilities and then conducting an informal tour of the building with each user group to record their observations and impressions as to how well the building functions, particular merits of the building, areas of failure, and details that need further attention.

#### 2.3 Interviews

Interviews are conducted with personnel from all installation departments which are involved with both the day-to-day and long-term operations of the buildings. Persons interviewed may include construction and maintenance engineers, buildings and grounds staff, and administrative personnel.

#### 2.4 Surveys

Short surveys are distributed to those users not involved in the walkthrough or interview portion of the evaluation to gain further input.

#### 2.5 Punchlist

The punchlist is a checklist of the buildings' components which are recorded and evaluated by the research team. These components include roof, foundation, exterior wall and windows, interior walls and doorways, building surfaces, and building fixtures.



## Design Evaluation: Fort Lewis

### 3.0 BACKGROUND: FORT LEWIS

#### 3.1 Installation Information

Fort Lewis is located in Pierce and Thurston Counties at the southern reach of Puget Sound in Northwest Washington. U.S. Interstate 5 passes through Fort Lewis and provides vehicular connections to Tacoma, Seattle, and Olympia. Fort Lewis covers approximately 120,000 acres.

The cantonment is comprised principally of two parts, the Main Base and North Fort Lewis. Most of the temporary World War II era buildings are located in North Fort Lewis. North Fort Lewis is composed of five "blocks" of buildings: Alpha Block (A), Bravo Block (B), Charlie Block (C), Delta Block (D), and Echo Block (E). The largest percentage of these buildings is used as barracks. Reflecting this dominant use, buildings evaluated in this study are barracks.

Two particular buildings were chosen for detailed study - buildings 9E4 and 9C26. Building 9E4 has undergone minimal renovation from its original built form. Building 9C26 has undergone more extensive renovation.

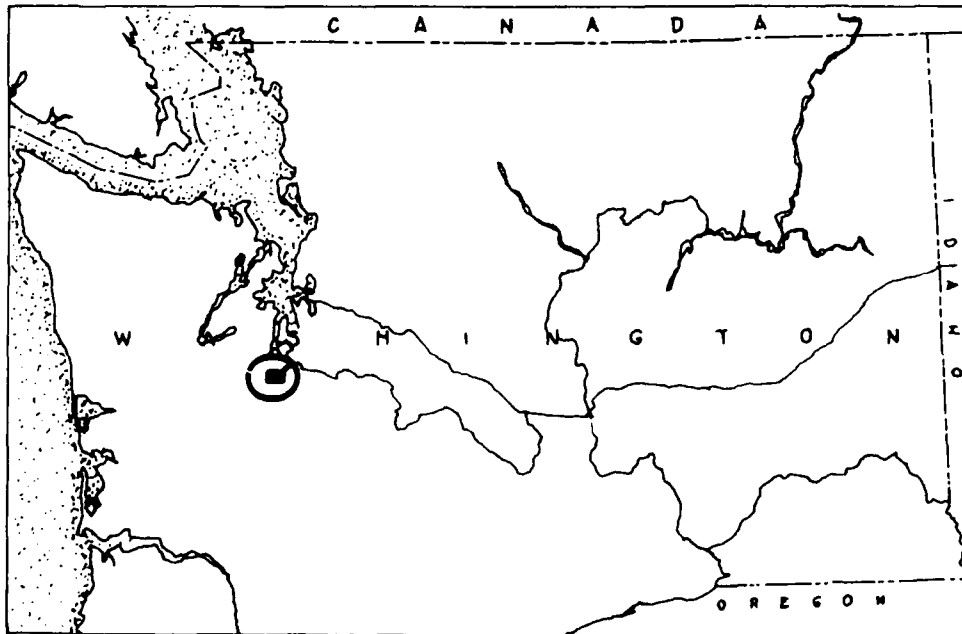


Fig.1: Vicinity map

Design Evaluation: Fort Lewis

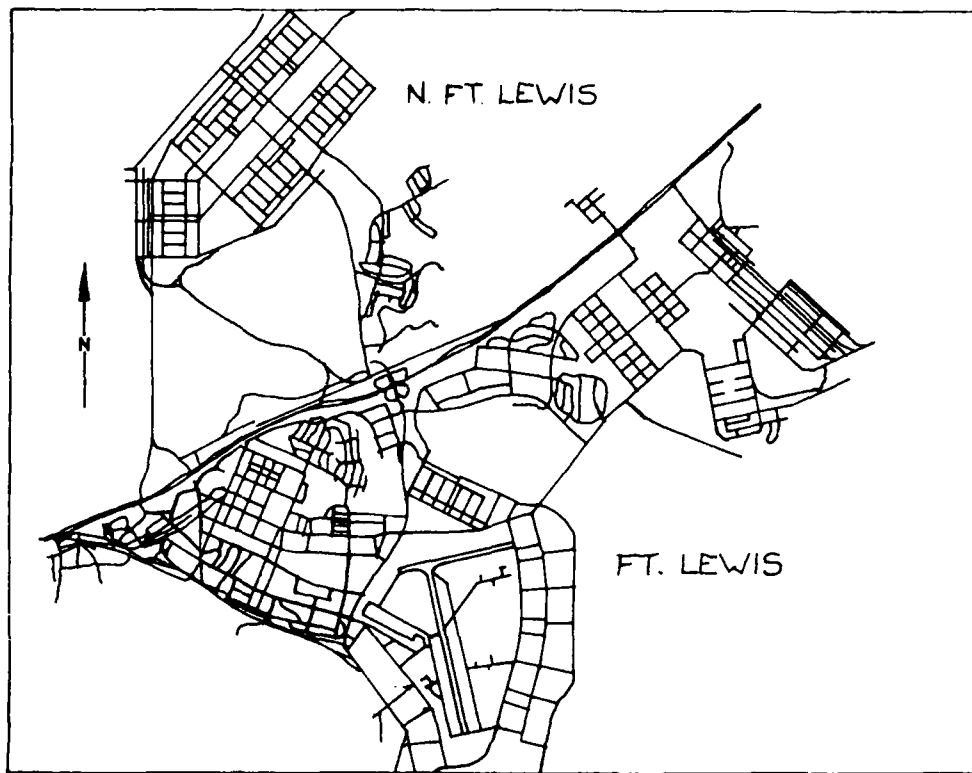


Fig.2: Installation map

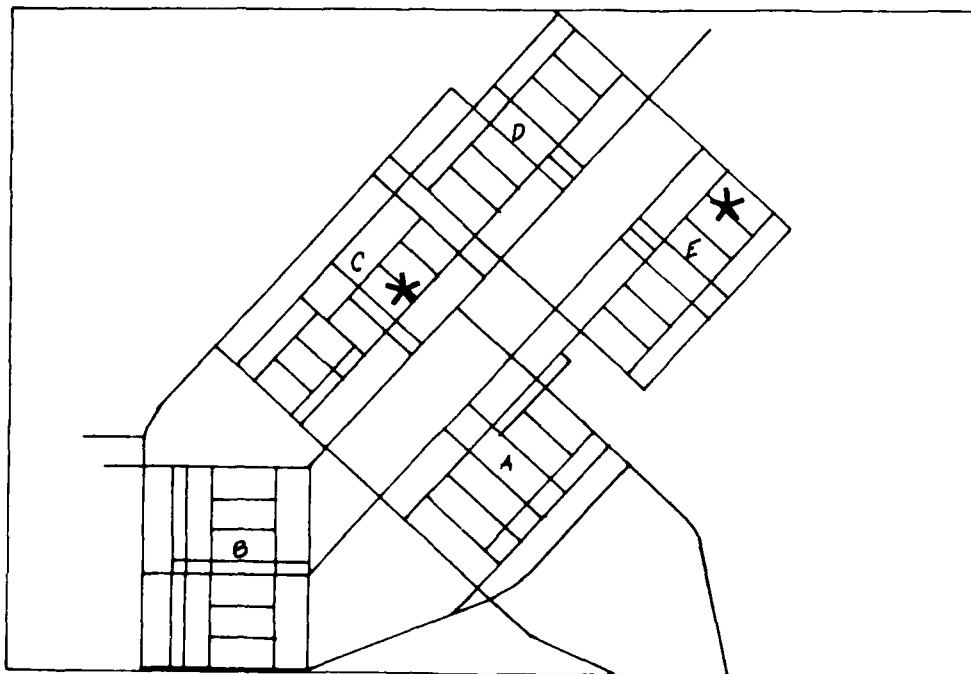


Fig.3: North Fort Lewis Map.

## Design Evaluation: Fort Lewis

### 3.2 Building Information

The barracks, 9C26 and 9E4, were virtually identical when originally built. They were built as two story open bay barracks of standard wood construction with 2x4 inch stud walls, and with larger members used in the roof, floor and ceiling construction. The buildings measure 82 feet by 30 feet and are 24 feet high at the peak of the roof. The foundations are eight inch square concrete piles, 10 feet on center, supporting 2x12 inch joists. There is concrete slab construction under the boiler rooms and latrines. There are three foot overhangs on the lateral facades and a two inch overhang on the end facades. The roofs, which have a pitch of approximately 1 in 2, were reshingled within the last five years. They have no gutters. The standard facilities in the latrines are either a communal urinal or separate urinals, six sinks with mirrors, four toilets, four showers, wash basin, washer and dryer. The buildings contain one stairwell and a wooden ladder fire escape.

Building 9E4 has undergone minimal change beyond this point, while Building 9C26 has undergone more extensive change. A comparison of the physical components of these buildings is set out in Table 1.

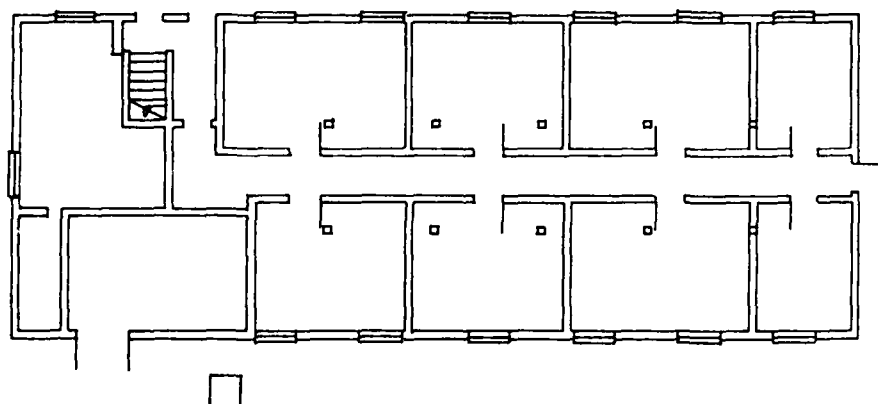


Fig.4: Typical Building Plan.

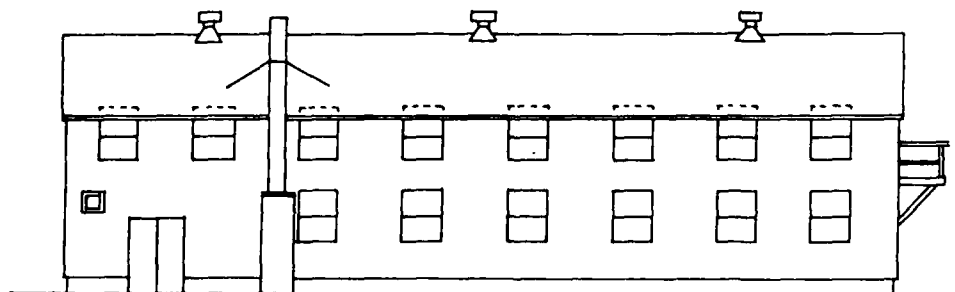


Fig.5: Typical Building Elevation.

Design Evaluation: Fort Lewis

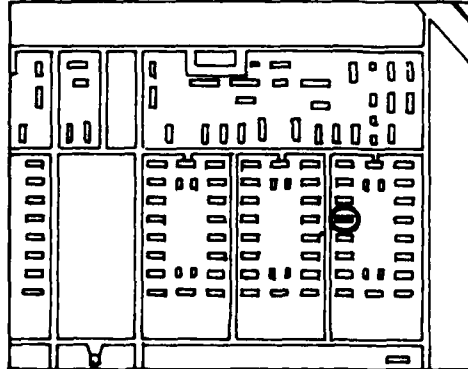
TABLE 1: COMPARISON OF EVALUATED BUILDINGS

BUILDING 9E4	BUILDING 9C26
<p>Floor: Covered with 9" square vinyl asbestos tiles over plywood subflooring with 4" trim at the wall/floor juncture. The latrines have concrete slab floors.</p> <p>Exterior Walls: Cladding: concrete asbestos tiles, 10.5"x 24". Windows: original double hung wood frame windows with no screens</p> <p>Interior Walls: Hall and partition walls are 1/8" fabric covered board. All other walls, as well as the ceiling, are covered with plywood.</p> <p>Doors: 6'-8" x 2'-11" metal.</p> <p>Heat: Provided to the individual rooms through baseboard hot water registers. There is one intake/return on each level outside the furnace room. There are no other returns. The only thermostat is located in the furnace room.</p> <p>Electricity: Four electrical outlets in each room. All room outlets are on the exterior wall.</p> <p>Lighting: Two fluorescent lighting fixtures, 8'-6" on center, are used in each double room. There are two 4' tubes in each fixture.</p>	<p>Floor: 12" square vinyl asbestos tile over plywood subflooring with 4" rubber molding at the wall/floor juncture. The latrines have a concrete slab floor.</p> <p>Exterior walls: Cladding: 5" aluminum siding over batt insulation. Windows: double hung anodized aluminum with screens.</p> <p>Interior Walls: Walls and ceilings are drywall with textured paint. The latrines have 4'-0" x 8'-0" textured vinyl panels.</p> <p>Doors: 2'-8" x 6'-9" solid core wood</p> <p>Heat: Hot air with two registers in each room with intake/return for each floor located outside the furnace room. The thermostat is located in the first floor hall above the air return duct.</p> <p>Electricity: Five electrical outlets in each room, with at least one outlet on each wall.</p> <p>Lighting: Two fluorescent lighting fixtures, 8'-6" on center, are used in each double room. Each fixture has two 4' tubes.</p>

## Design Evaluation: Fort Lewis

### 4.0 EVALUATION DATA: Building 9E4

#### 4.1 Building and Site



4.1

- 4.1.1 External Lighting
  - none, only a firelight
  - street light a security issue: more lighting would give a feeling of greater safety
- 4.1.2 Recreation Areas
  - barracks are near gym
  - have volleyball court
  - facilities judged adequate by users
- 4.1.3 Courtyards
  - need to be blacktopped
  - dust blowing into buildings is a problem in the summer when trucks use the quadrangles
- 4.1.4 Lawns
  - no comments recorded
- 4.1.5 Parking
  - nearest parking : 100 meters from barracks
- 4.1.6 Landscaping
  - none
- 4.1.7 Garbage Bins
  - if dumpsters were closer to barracks users would empty trash more often



4.1.1



4.1.2

## Design Evaluation: Fort Lewis

- 4.1.8 Pedestrian walkways  
- no comments recorded

- 4.1.9 Surfaces  
- many of the concrete asbestos tiles are badly cracked  
- there are boot and ball marks on the lower portions of the exterior walls  
- there is only one exterior firelight between and above the doors on the west side



4.1.10

- 4.1.10 Other  
- need to have water outlets outside for washing cars  
- would like exterior electrical outlets for weedeaters, car vacuums, etc  
- since buildings are near limits of base with major roads on other side of fence a security problem was mentioned with off-base personnel entering the base; some users felt that off-base personnel monitor their movements and are aware of when the buildings are empty  
- four exterior phone booths for six barracks



4.2.2

## 4.2 Communal Facilities

- 4.2.1 Cooking  
- none: not allowed in barracks
- 4.2.2 Laundry  
- washer and dryer in latrine  
- washing tub is sturdy enough but too small for washing field equipment and for wash buckets
- 4.2.3 Ironing  
- individual facilities: OK
- 4.2.4 Storage  
- no comments recorded



4.2.2

## Design Evaluation: Fort Lewis

### 4.2.5 Telephone

- having public phones in barracks would be a nuisance due to ringing late at night
- prefer existing exterior pay phones
- one base phone would be helpful in each room
- should have at least one base phone in hall

### 4.2.6 Notice Boards

- known to all occupants, information posted clearly in halls

### 4.2.7 Fire Extinguishers

- known to all occupants, information posted clearly in halls

### 4.2.8 Living

- no common areas in building, all in separate building

### 4.2.9 Other

- TV jacks (cable) would be desirable
- TV antenna desirable
- fire escapes are rotted and there is a fear they will collapse when stood on

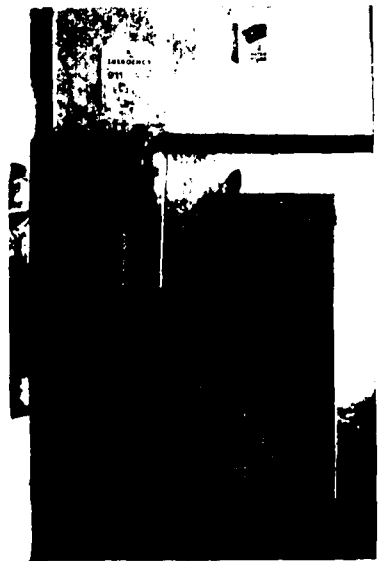
## 4.3 Circulation

### 4.3.1 Halls

- 1/8 in. fabric covered panelling is typically damaged
- floor tiles are long wearing but can be slippery
- no problems mentioned with ceiling

### 4.3.2 Stairs

- treads and risers replaced as needed
- some echo in stairwell
- most wall panels pushed in



4.2.7



4.2.9

## Design Evaluation: Fort Lewis

### 4.3.3 Doors

- 6'8" x 2'-11" metal doors have numerous locks (up to 3/door), but can be kicked in
- doors dented and bolts in doors compress panels
- numerous holes in doors from locks being ripped off

### 4.3.4 Lighting

- fluorescent lighting said to be adequate
- one control at either end of hall

### 4.3.5 Heating/Ventilation

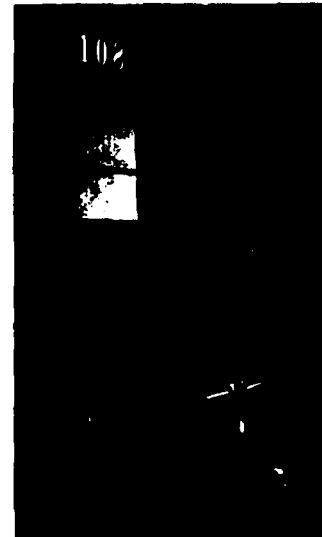
- no problems mentioned in halls
- heating unit in hall falling off wall

### 4.3.6 Noise

- lots of noise late
- can easily hear people in halls

### 4.3.7 Other

- only one electrical outlet in hall: doesn't work



4.3.3

## 4.4 Living Accommodations

### 4.4.1 Single/Double Rooms

- drafts occur under doors and through windows
- many windows inoperable
- no privacy in rooms

### 4.4.2 Surfaces

- walls are sheetrock with some plywood but not insulated: noise is a problem
- carpeted floor would be nice
- if exposed pipes on ceiling were covered it would be more pleasant
- would like to eliminate interior columns
- walls have 3.5 inch nailing rail 50 inches off floor not,



## Design Evaluation: Fort Lewis

however, adequate for all items which users want to hang on walls

- holes and nails in walls

### 4.4.3 Furniture Arrangement

- consists of chair, bed, locker, small locker, and desk
- all standard issue: no complaints or comments

### 4.4.4 Storage

- would like built-in wall lockers
- 90-100 square feet per soldier is outdated standard
- have both larger and more equipment now: need more storage space

### 4.4.5 Lighting

- no problems with fluorescent lighting
- have good natural light
- lights falling off ceiling due to pulling of on-off cord
- want to be able to control lights with wall mounted switches

### 4.4.6 Heating/Ventilation

- lack of thermostat a problem
- hot water heating system creates hot and cold spots
- forced air heat would be better
- lack of control creates extremes in temperature range
- electric heaters are not permitted but are used because of temperature extremes. This results in blown fuses or tripped circuit breakers
- loss of heat through windows a problem
- heat builds up in rooms
- no way to dissipate heat in rooms as there is little air circulation
- furnace room causes hot spots in the rooms above it and beside it



4.4.4



4.4.5

## Design Evaluation: Fort Lewis

- some break-ins into furnace room occur to change thermostat and quantity of heat coming into building
- natural ventilation is OK
- lack of user control over heat is considered problem
- some heating units falling off walls, some have been abused

### 4.4.7 Electrical Outlets

- number of outlets said to be inadequate
- all outlets along exterior walls: creates use problems
- extension cords needed but not allowed
- circuits blown 10-20 times per year

### 4.4.8 Security

- 2 wood bars jammed into each window for added security
- fire alarms are damaged: some hanging off ceiling
- evidence of broken locks and damaged doors

### 4.4.9 Noise

- can hear through walls, even at normal conversational levels: annoying and allows little privacy
- hot water heating system hisses when working

### 4.4.10 Other

- elements of personalization allowed but none observed
- average length of stay is one year
- as much time as possible spent away from barracks
- do not have enough space in rooms
- would like refrigerators which are standard issue

## Design Evaluation: Fort Lewis

### 4.5 Sanitary

#### 4.5.1 Surfaces

- some rot exists behind walls because didn't use exterior grade plywood behind tiles
- floors are slippery after showers
- ceiling paint is peeling from condensation



4.5.2

#### 4.5.2 Showers

- soap dishes coming off walls
- communal showers undesirable: would prefer individual shower stalls

#### 4.5.3 Toilets

- privacy is a problem as some toilets have no doors and face mirrors



4.5.3

#### 4.5.4 Urinals

- OK

#### 4.5.5 Sinks

- no backing board- sinks are coming off walls
- would like one faucet for both hot and cold water



4.5.5

#### 4.5.6 Cleaning Room/Storage

- inadequate: wet box needed for mop storage. Currently stored in outdoor closet.

#### 4.5.7 Mirrors

- OK

#### 4.5.8 Floor Drains

- some back-up in shower floor drains but not in others
- drain from washing machine periodically backs up

#### 4.5.9 Lighting

- incandescent lighting above sinks judged OK by users

## Design Evaluation: Fort Lewis

### 4.5.10 Heating/Ventilation

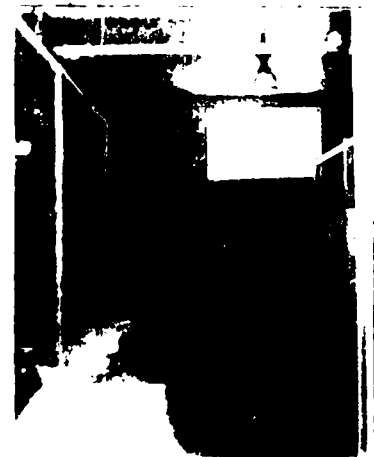
- one vent in shower inadequate
- condensation build-up sets off fire alarms
- mold and mildew problems are evident on ceilings
- heating units falling off wall



4.5.10

### 4.5.11 Other

- because all pipes are exposed, latrine is depressing
- garbage can in latrine needs to be larger because troops tend to empty individual waste baskets into latrine can because outdoor dumpster is too inconvenient
- windows in latrine are clear glass: provide no privacy. Have been painted over
- pipes are rusting
- water from faucets tastes like rust

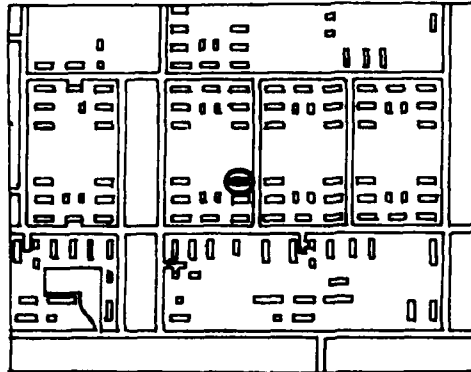


4.5.11

## Design Evaluation: Fort Lewis

### 5.0 EVALUATION DATA: Building 9C26

#### 5.1 Building and Site



5.1

- 5.1.1 External Lighting
  - adequate night lighting
- 5.1.2 Recreation Areas
  - adequate basketball and baseball
- 5.1.3 Courtyards
  - social activity takes place in space between buildings
  - can use space for barbeques and car washing
- 5.1.4 Lawns
  - not able to walk on grass-roped off
  - would prefer being able to use grass
- 5.1.5 Parking
  - plentiful and convenient
- 5.1.6 Landscaping
  - nothing except grass
  - existing trees provide shade
  - roots cause problems with sidewalk cracking
  - trees too close to building could cause foundation problems
- 5.1.7 Garbage Bins
  - scattered throughout area in strategic spots



5.1.4



5.1.6

## Design Evaluation: Fort Lewis

- 5.1.8 Pedestrian Walkways  
- paths between buildings should be paved

5.1.9 Surfaces

5.1.10 Other

### 5.2 Communal Facilities

- 5.2.1 Cooking  
- not allowed in barracks  
- coffee pots can be used if approved by fire marshall
- 5.2.2 Laundry  
- washer and dryer often broken  
- would like commercial grade machines  
- need more than one of each  
- wash basin is a problem: cracked, not bolted to wall, stains easily  
- only one wash basin for all troops in barracks  
- wash basin made of plastic: too light for much of the equipment- said to be inadequate
- 5.2.3 Ironing  
- centrally located in other building  
- service is affordable
- 5.2.5 Storage  
- said to be adequate  
- currently troops make use of unoccupied single room
- 5.2.6 Telephone  
- on-base phone located in building  
- phone inadequately secured to wall  
- public phone booths outside: 1 per barrack  
- this arrangement said to be acceptable



5.2.2



5.2.6

## Design Evaluation: Fort Lewis

- 5.2.7 Notice Boards
  - public information board located outside building and in mess hall
- 5.2.8 Fire Extinguishers
  - information readily available
- 5.2.9 Living
  - common area would be nice in building
  - necessary to go to next building presently, a problem, especially in rain
- 5.2.10 Furnace Room
  - creates heat problem in rooms above it



5.2.7

## 5.3 Circulation

- 5.3.1 Halls
  - no comments recorded
- 5.3.2 Stairs
  - treads are replaced as needed
- 5.3.3 Doors
  - exterior doors come off hinges due to mats being used to wedge doors open
  - exterior doors too heavy for their jambs
  - troops do not like push bars on exterior doors
- 5.3.4 Lighting
  - mentioned as being adequate
- 5.3.5 Heating/Ventilation
  - not a problem in halls
- 5.3.6 Noise
  - only a problem with rowdy troops



5.3.3

## Design Evaluation: Fort Lewis

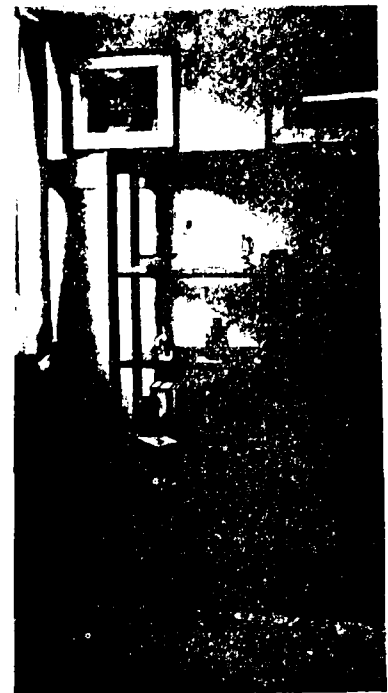
### 5.4 Living Accommodations

#### 5.4.1 Single/Double Rooms

- double rooms more common
- single rooms are for officers
- although space interrupted by columns, not a problem: columns used as part of shelving, for hanging coats, etc.
- would like bigger rooms and latrines in each room

#### 5.4.2 Surfaces

- paint has held up well over time
- no problem with personalization: it is encouraged
- hanging pictures is allowed and walls are repaired when troops leave
- nailing strips are provided on walls, reducing the number of items nailed on walls
- would like carpeting in rooms



5.4.2

#### 5.4.3 Furniture Arrangement

- standard issue includes bed, wall locker, night stand with wall locker insert, desk, chair, and lamp
- wall locker placement can be a problem

#### 5.4.4 Storage

- storage of military issued gear a problem in room
- not enough space for all required gear

#### 5.4.5 Lighting

- both artificial and natural light said to be OK
- troops like that desk lamp is provided

#### 5.4.6 Heating/Ventilation

- hot and cold spots exist on first floor
- the further a room is away from the furnace the colder it is



5.4.4



## Design Evaluation: Fort Lewis

- no problem with natural ventilation as windows are all operable
- would prefer individual heating controls

### 5.4.7 Electrical Outlets

- not enough for troops' personal possessions (TV's, clocks, etc.)
- need to have some form of power surge control: TV power socket blows out during electrical storms
- extension cords allowed
- no multi-pronged adaptors allowed
- have wall switch in room for overhead lights, preferred over pull cord



5.4.7

### 5.4.8 Security

- locks can be forced open
- pine door frames are soft and easily pried open

### 5.4.9 Noise

- normal noise levels are not a problem

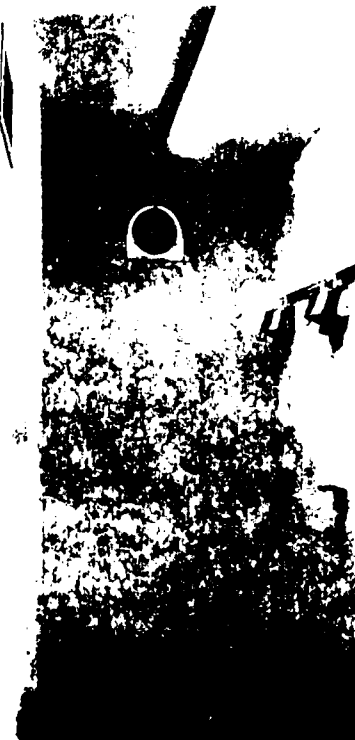
## 5.5 Sanitary

### 5.5.1 Surfaces

- concrete floor a problem in shower- can't be painted with non-skid surface. Floor mats used to help with this problem
- suspended ceilings said to be adequate- no problems reported

### 5.5.2 Showers

- problem with fixtures: different materials used in conjunction with one another and are not always compatible (plastic and metal common)
- 4 showers not adequate for normal morning activity
- back-up in morning to take shower



5.5.2

## Design Evaluation: Fort Lewis

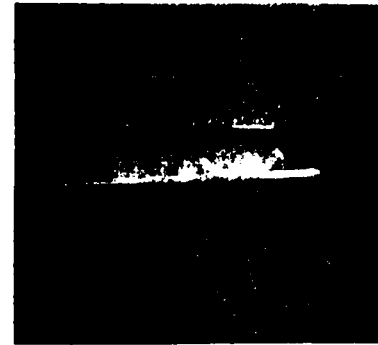
- usually only 3 showers working
- occassional problems with hot water shortages

### 5.5.3 Toilets

- number of toilets adequate

### 5.5.4 Urinals

- communal urinal said to be OK, but would prefer individual urinals
- fixture is inadequate as pipes leak
- needs bracing into wall
- has no flushing mechanism



5.5.4

### 5.5.5 Sinks

- number of sinks OK
- sinks need to be anchored to wall in more sturdy manner

### 5.5.6 Cleaning Room/Storage

- mops and squeegies stored in outside locker



5.5.6

### 5.5.7 Mirrors

- no problems mentioned

### 5.5.8 Drainage

- ponding on floor observed
- floor drains said to be adequate

### 5.5.9 Lighting

- natural and fluorescent lighting considered adequate

### 5.5.10 Heating/Ventilation

- moisture builds up on wall outside of shower which leads to need for repainting

### 5.5.11 Other

- electrical outlets should be placed above splash line
- some grooming appliances do not have long enough cords to use existing electrical outlets; outlets above mirrors would solve this problem
- water pressure good



5.5.11

Design Evaluation: Fort Lewis

- when fixtures repaired, often only parts are replaced- results in incompatible materials being used
- textured translucent glass in latrine windows allows privacy

## Design Evaluation: Fort Lewis

### 6.0 SUMMARY: Fort Lewis

While it was noted that the general appearance of the base could be improved by landscaping, the only major site problem observed was that there was generally inadequate parking. The parking that was available was inconveniently located.

The majority of the existing temporary wooden buildings are structurally sound. A large proportion of them have undergone some type of renovation, while others have had no renovation other than minimal roof repairs. The renovation work in the two buildings evaluated in this study consisted of partitioning the open bay barracks into single and double rooms for the troops. The differences between the two buildings are largely in the types and quality of materials used in the partitioning.

Because these buildings are simple structures with many standardized parts, they are no more difficult to maintain than any other building type on the base.

As the background information indicates, neither of the buildings evaluated in this study had any extensive remodelling done to the basic services (plumbing, heating, electrical).

The user evaluation assessment indicates that the use of better quality materials can increase the level of satisfaction. However, the decision to retain most of the original services compromised the rest of the work done on the buildings and the relative success of the restoration efforts. Most of the complaints in both buildings were directly related to the plumbing, heating, or electrical systems. It is evident from the data that the problems involved with the basic building systems overshadowed the improvements that were made to the extent that the building environment, as a whole, was less than satisfactory.

It is apparent, then, that in order for these rooms to be viewed by the occupants as a viable alternative to new troop units, the basic building service inadequacies must be addressed. With proper attention given to the building services and the choice of materials, World War II era open bay barracks can be converted into individualized quarters with success.

## Design Evaluation: Fort Lewis

### 7.0 CONCLUSIONS: Post Occupancy Evaluations

The Post Occupancy Evaluation studies undertaken at Fort Lewis, Fort Hood, and Fort Ord have led to several key conclusions.

These can be summarized as follows:

1. These buildings are generally in good shape and comprise an excellent stock of flexible structures which, when properly renovated, are a cost effective alternative to new construction.
2. The expertise required to properly renovate and maintain these buildings is generally available on the bases.
3. The failure to properly renovate these types of structures in the past has not been due to a lack of expertise but to their classification as temporary structures, thereby making them ineligible to receive adequate funding for a comprehensive renovation.
4. In buildings in which adequate funds have been invested, the renovations have been successful because of two key programmatic decisions - the first, to remove all existing services and replace them with modern, efficient systems and the second, to view the building as a structural shell and rebuild it using current construction technology.
5. In buildings in which the users' specific needs have been taken into account, the renovated buildings serve those needs in an optimum manner.

In summary then, the key to successful renovation of this building stock is a simple and straightforward one - remove the designation "temporary" and provide adequate funding so that a comprehensive upgrading strategy can be employed. This represents a change in policy rather than a change in design standards.

## **APPENDIX B:**

### **EVALUATION CASE STUDY, FORT HOOD, TX**

#### **CONTENTS**

	<b>Page</b>
<b>1.0 INTRODUCTION .....</b>	<b>62</b>
<b>2.0 PROCEDURE.....</b>	<b>64</b>
<b>2.1 Evaluation Methodology</b>	
<b>2.2 Walkthroughs</b>	
<b>2.3 Interviews</b>	
<b>2.4 Surveys</b>	
<b>2.5 Punchlist</b>	
<b>3.0 BACKGROUND: Fort Hood .....</b>	<b>65</b>
<b>3.1 Installation Information</b>	
<b>3.2 Building Information</b>	
<b>4.0 EVALUATION DATA: Building 4468 .....</b>	<b>69</b>
<b>4.1 Building and Site</b>	
<b>4.2 Communal Facilities</b>	
<b>4.3 Circulation</b>	
<b>4.4 Office Environment</b>	
<b>5.0 SUMMARY: Fort Hood .....</b>	<b>74</b>
<b>6.0 CONCLUSIONS: Post Occupancy Evaluations .....</b>	<b>75</b>

## LIST OF FIGURES

Number		Page
1	Vicinity Map	65
2	Installation Map	66
3	Typical Building Plan	68
4	Typical Building Elevation	68

## Design Evaluation: Fort Hood

### 1.0 INTRODUCTION

This document has been produced as a working document during the first stage of a research project for the U.S. Army Construction Engineering Research Laboratory. The overall goal of the project is to develop a methodology for evaluating U.S. Army installation buildings constructed during the 1940s and for developing design guidelines for upgrading these buildings to meet today's requirements.

These World War II era buildings were designed and built to accommodate several uses. The buildings were designed as simple, utilitarian temporary structures. Although the intention was to demolish them when they were no longer needed, many of the buildings are still in use today and fulfill a significant need. Some remain largely in the condition that they were in when built, unmodified from their original plan. Others have, over the years, been substantially altered as expediency dictated. Both deterioration with time, and in some cases, the alterations made to their structures over the years, have made these buildings aesthetically unpleasant.

An evaluation of these buildings was undertaken at three Army bases: Fort Lewis, Washington, Fort Hood, Texas, and Fort Ord, California, the latter study being performed by researchers at the University of Cincinnati School of Planning, as part of a sub-contract to the Center for Architecture and Urban Planning Research (CAUPR), University of Wisconsin-Milwaukee. The objectives of this evaluation were:

- \* to study site conditions.
- \* to document the physical condition of the buildings.
- \* to evaluate ease of maintenance.
- \* to analyze building services.
- \* to assess user satisfaction.

The Fort Hood study involved a detailed evaluation of one building, typical of its type: Building 4468.

Stages 2 and 3 of this project will develop and present generic design guidelines for the evaluation and upgrading of this building type.



## Design Evaluation: Fort Hood

The purpose of the methodology being developed is to provide guidance to planners and architects for the upgrading of World War II era buildings to meet the needs of the 1980s and for the integration of these buildings into the overall planning needs of U.S. Army installations. A parallel study undertaken by the Department of Urban and Regional Planning, University of Illinois, Champaign/Urbana has investigated the economic feasibility of the upgrading of World War II era buildings.

## Design Evaluation: Fort Hood

### 2.0 PROCEDURE

#### 2.1 Evaluation Methodology

The evaluation methodology is intended to be pragmatic and of short duration. This results in the a minimal impact of the evaluation procedure on the day to day operation of the installation and the people using the particular building being investigated.

The methodology is based on a combination of four techniques with the greatest emphasis being placed on the walkthroughs.

#### 2.2 Walkthroughs

Walkthroughs consist of identifying users of the facilities and then conducting an informal tour of the building with each user group to record their observations and impressions as to how well the building functions, particular merits of the building, areas of failure, and details that need further attention.

#### 2.3 Interviews

Interviews are conducted with personnel from all installation departments which are involved with the day-to-day and long-term operation of the buildings. Persons interviewed may include construction and maintenance engineers, buildings and grounds staff, and administrative personnel.

#### 2.4 Surveys

Short surveys are distributed to those users not involved in the walkthrough or interview portion of the evaluation to gain further input.

#### 2.5 Punchlist

The punchlist is a checklist of the buildings' components which are recorded and evaluated by the research team. These components include roof, foundation, exterior wall and windows, interior walls and doorways, building surfaces, and building fixtures.

## Design Evaluation: Fort Hood

### 3.0 BACKGROUND: FORT HOOD

#### 3.1 Installation Information

Fort Hood is located...

Fort Hood is comprised principally of the Main Base, North Fort Hood, and West Fort Hood. Most of the temporary World War II era buildings are located on the Main Base. The World War II era buildings located there are not concentrated in any one area but are found scattered throughout the base. A number of these buildings have been demolished and others are slated for demolition in the future. The largest percentage of these buildings are used for administrative purposes.

Reflecting that dominant use, the building evaluated in this study, Building 4468, is an administration building. It is a building that has undergone extensive renovation from its original built form.

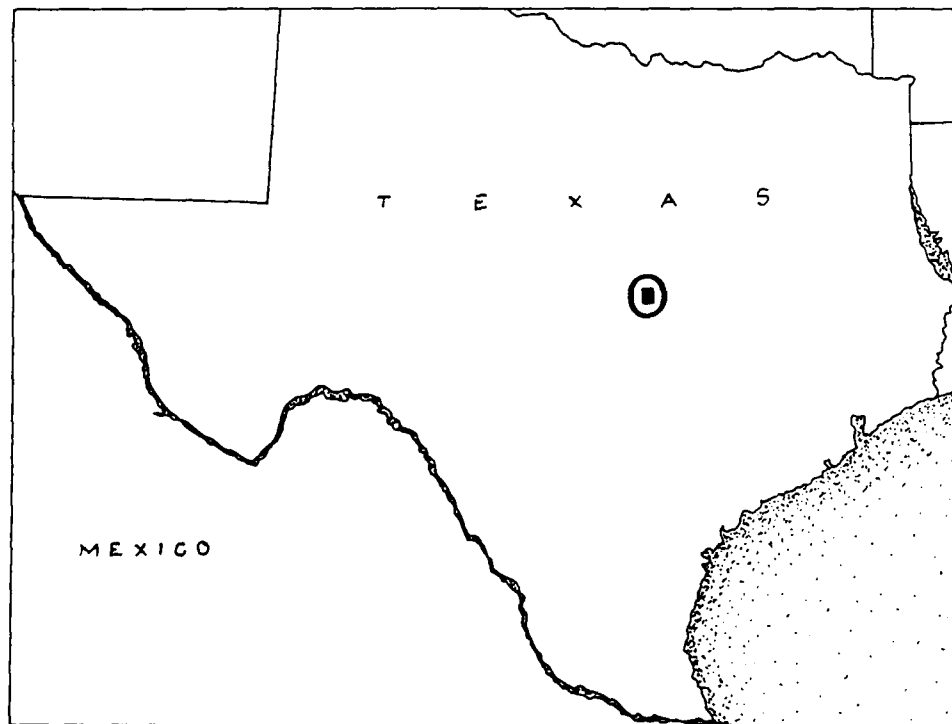


Fig. 1: Vicinity map

66

## Design Evaluation: Fort Hood

### 3.2 Building Information

Building 4468, when originally built, was a single story mess hall of standard wood construction with 2x4 inch stud walls, and with larger timbers used in the roof, floor, and ceiling construction. The building measures 123 feet by 24 feet and is 13.5 feet high at the peak of the roof. The foundation are concrete piles, 8'-0" on center, supporting 2x12 inch floor joists. There is a concrete slab construction under the area that was occupied by the kitchen. The roof, which has a pitch of approximately 1 in 2, is covered with asphalt shingles. There is a one foot overhang on the longer sides, and a two inch overhang on the shorter sides. The roof has gutters with downspouts evenly spaced around its perimeter and is covered with asphalt shingles. The building is entirely handicapped accessible.

The materials used in renovating Building 4468 are as follows:

Floor: Covered with 12" square vinyl tiles over a sub floor on 2" x 12" joists. Carpeting over the portion of the building with the concrete slab foundation. 3" wood trim at the wall/floor juncture.

#### Exterior Walls:

Cladding: steel siding, 8" x 12' over 1/2 inch rigid styrofoam backed by blown in insulation.

Windows: single hung aluminum with screens, spaced according to the interior organization.

#### Interior Walls:

4'x 8' wood panelling. Suspended ceiling composed of 2'x 4' panels.

#### Doors:

Interior: 2'11" x 6'8" hollow core wood.

Exterior: 2'11" x 6'8" metal with weatherstripping and exterior mounted auto-returns.

#### Heating/Air Conditioning:

Provided to the building by gas forced-air unit. One intake/return in the hall outside the furnace room. No other returns. One supply duct in each office. Air supply ducts 12'-0" on center in open bay office area. The only thermostat is located on the wall outside the furnace room.

#### Electricity:

Electrical outlets positioned according to the needs of the occupants.

## Design Evaluation: Fort Hood

- Lighting: 2'x 4' two-tube fluorescent fixtures integrated with the ceiling panels - 16'-0" on center in the halls, 8'-0" on center in the open bay offices in two rows 6'-0" apart.

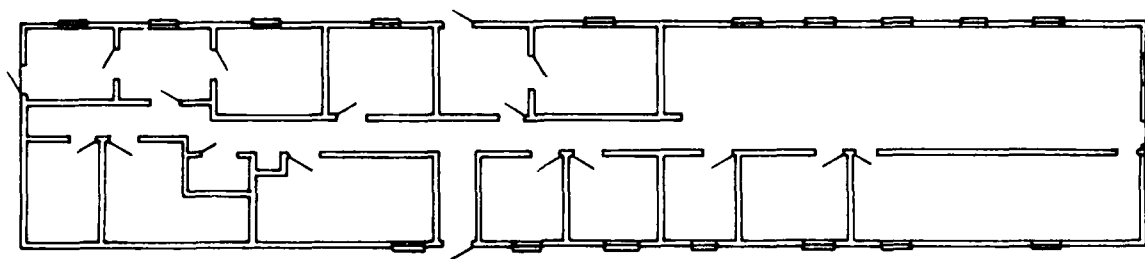


Fig.3: Typical Building Plan

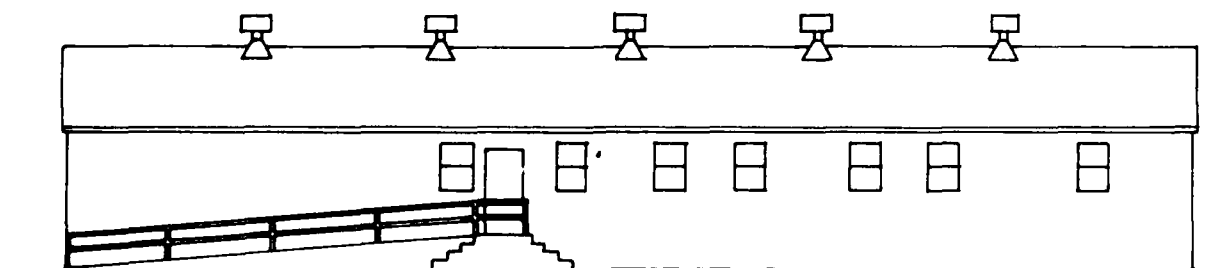
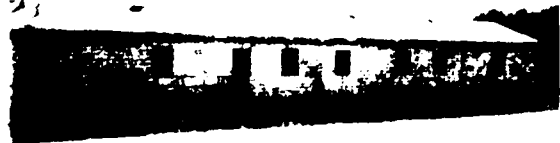
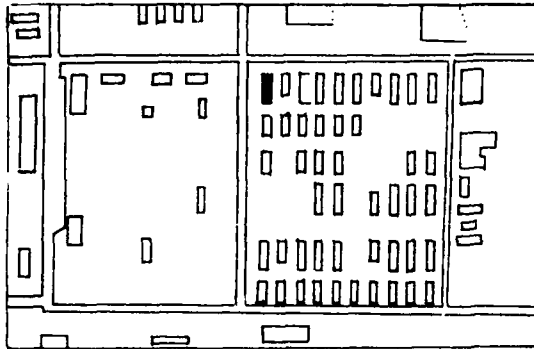


Fig.4: Typical Building Elevation

## Design Evaluation: Fort Hood

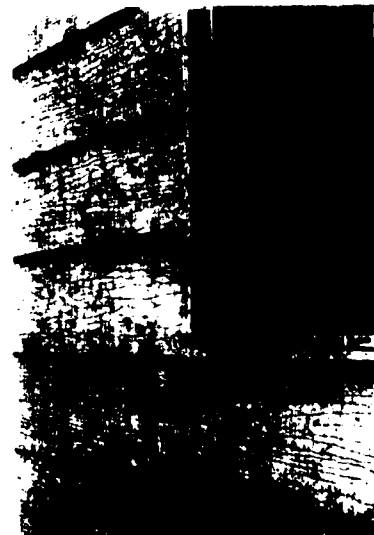
### 4.0 EVALUATION DATA: Building 4468

#### 4.1 Building and Site



4.1

- 4.1.1 External Lighting
  - no comments recorded
- 4.1.2 Lawns
  - no drainage problems around perimeter of building
- 4.1.3 Parking
  - on street parking cited as adequate
- 4.1.4 Garbage Bins
  - located adjacent to building: said to be convenient
- 4.1.5 Pedestrian Walkways
  - concrete walks between buildings: recently repaired/replaced as needed
- 4.1.6 Surfaces
  - sunlight and heat require steel siding to reduce deterioration/rot
  - no storm windows are used: payback period (20 years) is considered to be too long
  - some roof sagging has occurred due to overloading with shingles
  - no leakage problems with roof
  - when renovated, building made weathertight: fresh air exchange in furnace room provided to prevent potential



4.1.6

## Design Evaluation: Fort Hood

- noxious gas build-up
- all windows are caulked inside and out

- 4.1.7 Other
- two plumbing outlets on exterior of building

### 4.2 Communal Facilities

- 4.2.1 Storage
- storage room off open bay can be converted to office if needed
- 4.2.2 Fire Extinguishers
- no sprinklers
  - no fire alarms
  - fire extinguishers located in hall, near exit door and in open office bay
- 4.2.3 Break Area
- currently no defined break area
  - inadequate: would like to see separate break room
- 4.2.4 Furnace Room
- central air conditioning unit with integral heater
  - two residential sized systems used: cheaper than single commercial unit
  - flexible ductwork can be moved if required
  - radical changes in temperature are electronically monitored: central facility automatically notified
  - thermostat accessible to office workers
  - air intake vent/fan is noisy



4.2.2



4.2.4

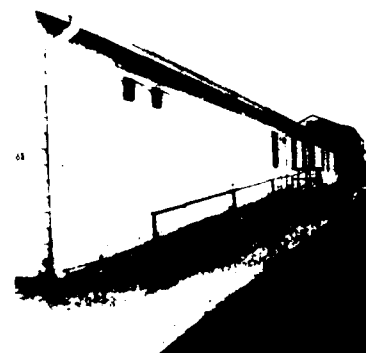


## Design Evaluation: Fort Hood

### 4.3 Circulation

#### 4.3.1 Entry/Access

- building is entirely handicapped accessible
- fountains and latrines designed for handicapped use
- four exits, one on each side of the building



4.3.1

#### 4.3.2 Halls

- no problems noted

#### 4.3.3 Doors

- no problems noted

#### 4.3.4 Lighting

- dark entrance area due to no interior lighting near entrance

#### 4.3.5 Heating/Ventilation

- no problems noted

#### 4.3.6 Noise

- no problems noted

### 4.4 Office Environment

#### 4.4.1 Open Bay/Individual Office

- not adequate space for individual engineers to function efficiently in open bay
- cigarette smoke cited as a problem in open bay
- some individuals would prefer individual offices for added privacy



4.4.1

#### 4.4.2 Surfaces

- original ceramic tile not adequately removed from concrete slab foundation:
- carpeting used over concrete slab to hide uneven floor surface, but vinyl tiles in latrines can't hide uneven surface underneath



4.4.2

## Design Evaluation: Fort Hood

- 4.4.3 Work Station Arrangement
  - need more equipment to perform job properly
  - current arrangement inadequate because of space limitations
- 4.4.4 Storage
  - more storage space for documents and files needed
- 4.4.5 Lighting
  - natural light through west and south windows can create glare on computer screens
- 4.4.6 Heating/Ventilation
  - some heat build-up at stations near windows on south and west sides
- 4.4.7 Electrical Outlets
  - ample: spaced as needed by the individual work stations
- 4.4.8 Telephone
  - phone lines carried in conduit along wall for easy access
  - lines can be added or removed easily
- 4.4.9 Security
  - tumble type locks used in all doors
  - building has had no problems with security or vandalism
- 4.4.10 Noise
  - would like computer equipment in separate room to reduce noise
- 4.4.11 Other
  - problems with old electric system have been prevented by not retaining any original electrical work
  - completely new electrical system installed
  - computer and phone lines exposed on electrical panel in



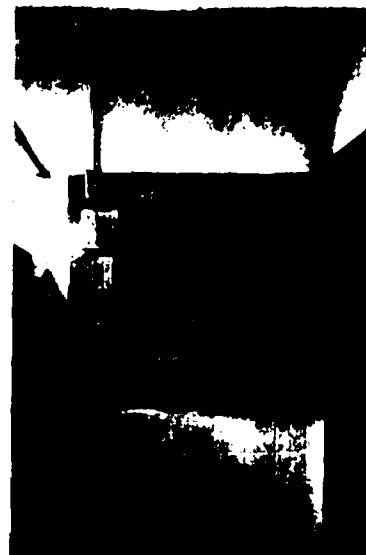
4.4.4



4.4.8

## Design Evaluation: Fort Hood

- men's latrine
- this building is liked by some because of its small size which leads to less people traffic and fewer distractions



4.4.11

## Design Evaluation: Fort Hood

### 5.0 SUMMARY: Fort Hood

Immediate site considerations were generally adequate and were not mentioned as being a concern. There were no major observable site problems, however, the general appearance of the base could be improved by landscaping.

The building in this study had been completely rebuilt except for the foundations, stud walls, and roof structure, which are those of the original wood building.

Because the building is a simple structure and has been extensively remodelled using standardized parts, it is as easy to maintain as any other building type on the base.

When the building was renovated, all of the existing building services (plumbing, heating, electrical, air conditioning) were replaced with completely new services.

The users of this building are primarily engineers who, when consulted on the renovations, were able to specify a building that would suit their needs. In reviewing the evaluation data, it is clear that the lack of any substantial problems with the building has resulted from the users' input. This input, in combination with the decision to put in all new services, has led to this building being virtually problem free.

The user evaluation assessment suggests that if an adequate budget is provided so that antiquated services can be replaced, and if the potential users are given enough information on which to make an evaluation of the planned renovations, then these World War II era buildings can be converted into building stock that will provide a useful and relatively problem-free work environment.

Some of the inherent advantages of this building stock are:

- \* they are built with a higher grade of timber than is commercially available today.
- \* their simple construction and layout does not require highly specialized materials.
- \* they are adaptable to a wide range of uses.
- \* they can be made very energy efficient.
- \* they are easily converted to meet future changes in building or user requirements.

## Design Evaluation: Fort Hood

### 6.0 CONCLUSION: Post Occupancy Evaluations

The Post Occupancy Evaluation studies undertaken at Fort Lewis, Fort Hood, and Fort Ord have led to several key conclusions.

These can be summarized as follows:

1. These buildings are generally in good shape and comprise an excellent stock of flexible structures which, when properly renovated, are a cost effective alternative to new construction.
2. The expertise required to properly renovate and maintain these buildings is generally available on the bases.
3. The failure to properly renovate these types of structures in the past has not been due to a lack of expertise but to their classification as temporary structures, thereby making them ineligible to receive adequate funding for a comprehensive renovation.
4. In buildings in which adequate funds have been invested, the renovations have been successful because of two key programmatic decisions- the first, to remove all existing services and replace them with modern, efficient systems and the second, to view the building as a structural shell and rebuild it using current construction technology.
5. In buildings in which the users' specific needs have been taken into account, the renovated buildings serve those needs in an optimum manner.

In summary, then, the key to successful renovation of this building stock is a simple and straightforward one- remove the designation "temporary" and provide adequate funding so that a comprehensive upgrading strategy can be employed. This represents a change in policy rather than a change in design standards.

## **APPENDIX C:**

### **EVALUATION CASE STUDY, FORT ORD, CA**

#### **CONTENTS**

	<b>Page</b>
<b>1.0 INTRODUCTION .....</b>	<b>78</b>
<b>2.0 PROCEDURE .....</b>	<b>80</b>
2.1 Evaluation Methodology	
2.2 Walkthroughs	
2.3 Punchlist	
2.4 Interviews	
2.5 Surveys	
2.6 Operational Method Used	
<b>3.0 BACKGROUND: FORT ORD .....</b>	<b>81</b>
3.1 Installation Information	
3.2 Location	
3.3 Climate	
3.4 Soil	
3.5 Population	
3.6 Building Statistics	
3.7 Temporary Buildings	
3.8 Classification of Construction Types	
3.9 General Evaluation Data	
<b>4.0 GENERAL EVALUATION DATA: (based on SBCS form</b> —see Annex A) .....	<b>87</b>
4.1 Roofs	
4.2 Foundations	
4.3 Exterior Walls	
4.4 Interior Walls	
4.5 Ceilings	
4.6 Floors	
4.7 Windows	
4.8 Doors	
4.9 Electric Lighting	
4.10 Daylighting	
4.11 H.V.A.C.	
4.12 Electrical Service	
4.13 Plumbing	
4.14 Stairways	
4.15 Entry	
4.16 Handicapped Access	
4.17 Overall Evaluation	
4.18 Issues	

## CONTENTS (Cont'd)

	Page
<b>5.0 USER EVALUATION .....</b>	<b>100</b>
5.1 User Classification	
5.2 Occupants' Evaluations	
5.3 Maintainer's Evaluations	
5.4 Martinez Hall Commentary	
<b>6.0 CONCLUSIONS .....</b>	<b>105</b>
6.1 Suggested Construction	
6.2 Suggested Future Uses	
6.3 Historical Significance	

### ANNEX A

## Design Evaluation: Fort Ord

### 1.0 INTRODUCTION

This document had been produced as a working document during the first stage of a research project for the U.S. Army Construction Engineering Research Laboratory. The overall goal of the project is to develop a methodology for evaluating U.S. Army installation buildings constructed during the 1940s and for developing design guidelines for upgrading these buildings to meet today's requirements.

These World War II era buildings were designed and built to accommodate several uses. The buildings were designed as simple, utilitarian temporary structures. Although the intention was to demolish them when they were no longer needed, many of the buildings are still in use today and fulfill a significant need. Some remain largely in the condition they were in when built, unmodified from their original plan. Others have, over the years, been substantially altered as expediency dictated. Some buildings are still utilized for their original purpose. Others are currently used for different functions including both new personnel activities as well as storage. And some are no longer in use and are presently empty.

An evaluation of these buildings was undertaken at three Army bases: Fort Lewis, Washington; Fort Hood, Texas; and Fort Ord, California. The first two studies were done by the Center for Architecture and Urban Planning Research (CAUPR), University of Wisconsin-Milwaukee, whereas the latter study was performed by researchers at the University of Cincinnati School of Planning under a sub-contract to CAUPR.

Stage 2 of the project will detail design recommendations for these buildings. Stage 3 will suggest generic design guidelines for the evaluation and upgrading of the buildings.

The purpose of the methodology being developed is to provide guidance to planners and architects for the upgrading of World War II era buildings to meet the needs of the 1980s and for the integration of these buildings into the overall planning needs of U.S. Army installations.

This report covers the evaluation case study executed at Fort Ord, California. While the methodology utilized was related to that developed by University of Wisconsin-Milwaukee (UWM), the particular approach followed was



## Design Evaluation: Fort Ord

distinct in several aspects. For one thing, the approach was not specifically a post-occupancy evaluation (POE) but rather was considered as a post-utilization evaluation (PUE). The particular difference entails concentrating on future possible uses based on observable conditions and "user" evaluations versus comparing results of occupancy as measured against intentions used in design. Another distinction was that while the evaluation studies done by UWM tended to concentrate on a few buildings (two at Fort Lewis and only one at Fort Hood), this study was rather diverse and attempted to identify and evaluate the broad range of temporary building types that are still utilized at Fort Ord.

## Design Evaluation: Fort Ord

### 2.0 PROCEDURE

#### 2.1 Evaluation Methodology

The evaluation methodology is intended to be pragmatic and of short duration. This results in a minimal impact of the evaluation procedure on the day to day operation of the subject building.

The methodology was intended to be based on a combination of four techniques: walkthroughs, physical condition evaluations, interviews, and surveys. However, the conditions faced during the site visit required adapting this methodology on an impromptu basis.

#### 2.2 Walkthroughs

This method consists of identifying users of the facilities and then conducting an informal tour of the building with each user group to record their observations and impressions as to how well the building functions.

#### 2.3 Physical Condition Evaluations

The Physical condition evaluations are based on a checklist of building components that are evaluated and recorded by the investigating team during inspection of particular buildings.

#### 2.4 Interviews

Interviews are conducted with personnel from all post departments which are involved with the day to day and long term operation of the buildings.

#### 2.5 Surveys

Short surveys are distributed to those users not involved in the walkthrough or interview portion of the evaluation to gain further input.

#### 2.6 Operational Method Used

During the site visit, actual user groups were not identified so that the methodology had to be somewhat modified. Essentially, surveys were eliminated and walkthroughs were adjusted to impromptu discussions when doing the physical condition evaluations. Interviews were also conducted, but only on an availability basis.

Design Evaluation: Fort Ord

### 3.0 BACKGROUND: FORT ORD

#### 3.1 Installation Information

Fort Ord, originally known as Camp Clayton, came into being in 1917. At that time, it included only 200 acres along what is now California State Highway 1. Since this modest beginning, through various land acquisitions, the area of Fort Ord has increased to a total of 28,036.54 acres. Today, Fort Ord is the home of the 7th Infantry Division.

#### 3.2 Location

Fort Ord is situated 112 miles southeast of San Francisco in Monterey County, California. The installation, which is 7 miles north of the city of Monterey, extends 7 1/2 miles along State Highway 1. At its northern boundary is the community of Marina and at its southern boundary are the communities of Seaside and Del Ray Oaks.

#### 3.3 Climate

The climate is generally mild and classified as temperate. Temperatures remain moderate throughout the year, with the daily average varying less than 20 degrees from maximum to minimum. Excessive heat requiring mechanical cooling for thermal comfort is not normal, nor is frost. Space heating, however, is necessary.

The annual rainfall is approximately 18 inches with the heaviest precipitation from November to February. During the summer season precipitation is rare. However, during the spring and summer, due to the location on the eastern edge of Monterey Bay, fog coming from the ocean is normal.

#### 3.4 Soil

The soil at Fort Ord is generally sandy and sandy clay fines. The porous nature of the soil generally allows for ground drainage during rainfall.

#### 3.5 Population

The "working" population of Fort Ord is approximately 19,000 divided among 14,473 enlisted personnel, 2,068 officers, and 2,427 civilians.

## Design Evaluation: Fort Ord

3.6.2 In terms of the 3,920 buildings at Fort Ord, 69 percent are of permanent construction, 3 percent are of semi-permanent construction and 28 percent are of temporary construction. Excluding the 1,608 structures allocated to family housing, the allocation of structures between construction types is 26 percent of permanent construction, 6 percent of semi-permanent construction and 68 percent of temporary construction.

3.6.3 The family housing units provide between 1,160 square feet to 1,500 square feet per family in structures which are single-family, two-family and multi-family units. Excluding these structures, the average floor area per building is 11,200 +/- square feet per building classified as permanent, 2,200 +/- square feet per building classified as semi-permanent and 3,275 +/- square feet per building classified as temporary

### 3.7 Temporary Buildings

3.7.1 At Ft. Ord the World War II temporary buildings can be categorized in three groups: 1-storey structures with slab on grade, 1-storey structures with wood floors above grade, and 2-storey structures. While the 2-storey structures are essentially structures with wooden floors above grade, many of them do have a slab on grade for that portion of the building allocated to the mechanical equipment room, the latrine, and the "entry."

3.7.2 The wooden structures can also be categorized as those with interior wood columns and those without any interior columns. All the 2-storey barracks buildings have interior columns which extend from the concrete "footings" to the roof. The columns are essentially on a 10'-0" module. In those buildings without a slab on grade at the latrines, the spacing of the first floor supports are essentially on a 5'-0" module in order to accommodate the floating concrete slab.

In the 1-storey structures, if the floor is above grade, it is supported on wood piles, again on a 10'-0" module. The roof, however, is usually supported by a truss that runs full width so there are no interior columns. Since the span of the 1-storey structures is 30'-0", which is also the width of the 2-storey structures and since both one and 2-storey structures have comparable roof pitches, it appears that the columns on the second floor of the 2-storey structures might be superfluous, if the roof structure were nominally reinforced.

## Design Evaluation: Fort Ord

Of the total military population, currently about one half are unaccompanied and one half are accompanied. Therefore, in addition to the 19,000 "working" population, there are approximately 20,000 dependents of military personnel that also reside either on post or in the Monterey Bay area.

For the 8,083 military personnel that are accompanied, there are approximately 5,000 family housing units on post. The actual number of units is not clear. In the 1985 Commander's Annual Installation Survey (CAIS) both 4,680 and 5,047 are listed as the total number of family housing units. By a tally of the June 1986 Building Information Schedule (BIS) data, there are 4,532 family housing units (category code prefix 711). And according to the May 1986 Tabulation of Existing and Required Facilities for Long Range Planning (AR 210-20), there are 4,767 family housing units on post and 3,316 units off post.

For the approximately 8,600 unaccompanied personnel there are currently 66 permanent barracks buildings housing 6,880 enlisted service personnel. On this basis, it may be assumed that up to approximately 1,700 enlisted personnel are currently housed in World War II temporary barracks.

### 3.6 Building Statistics

On the 28,072.24 acres of the post area there are a total of 3,920 structures with a total floor area of approximately 15,530,500 square feet.

3.6.1 Of the total of 15 1/2 million square feet of building space, almost 7 million square feet or 45 percent of the total floor area is allocated to family housing units. Most of these family housing units are in individual structures which are located towards the perimeter of the post. The family housing units are all classified as being of permanent construction type. The balance of 8 1/2 million square feet provides the interior space for all remaining indoor activities accommodated at Fort Ord. The types of construction for this balance of building, based on a square foot allocation, are 54 percent in permanent construction, 3 percent in semi-permanent construction and 43 percent in temporary construction. However, based on the total floor area of 15 1/2 million square feet, temporary construction constitutes only 23 percent of the total floor area on the post.

## Design Evaluation: Fort Ord

3.7.3 In some 1-storey structures, specifically those that were originally built as horse barns (Fac. Nos. 1420's and 1430's), the building width is around 48'-0" and the roof structure rests on interior columns located at 12'-0" on center. However, some of these interior columns have in certain instances been removed after some reinforcement to the roof truss. No apparent sagging of the roof has resulted from these modifications.

3.7.4 In other 1-storey structures, even with spans in excess of 50'-0", no interior columns were used. Since the wood trusses have the structural capacity to support the roof loads, the original use of interior columns was apparently related to the requirements of interior use rather than structural necessity.

### 3.8 Classification of Construction Types

3.8.1 The IFS standards list three types of construction: temporary, semi-permanent and permanent. While the definition of these types of construction are presented in terms of the projected life expectancy of the construction (e.g. under five years for temporary, five to twenty-five years for semi-permanent, and over twenty five years for permanent), the general understanding is that rather than life expectancy, construction materials are the basis for the classification. On this basis, all wood construction is listed as temporary, structures with metal enclosure are listed as semi-permanent and masonry or concrete structures are listed as permanent. This use of building materials as the basis for determining type of construction (T,S,P), while inconsistent with the IFS explanation of the categories, is consistent with all observed building classifications.

3.8.2 While there is logic in assuming that the materials used in construction affect the life expectancy of a structure, the current assignment of type of construction on this basis does not seem appropriate. This is obvious when we realize that the buildings which are being evaluated, although classified as temporary, have been effectively utilized for more than forty-five years! At Fort Ord, due to the proximity of the ocean and the temperate climate, the inaccuracy of the current method of assigning type of construction is apparent. One observes that the metal buildings, although "semi-permanent" are more deteriorated than comparable or older wooden, "temporary" buildings. Also, relatively new, permanent structures already show signs of rusting reinforcing steel and concrete spawling.

## Design Evaluation: Fort Ord

3.8.3 Another interesting observation related to this confusion over classification of construction types was the current effort to upgrade the family housing units in the Joseph W. Stillwell Park area. This program is intended to upgrade these housing units, which were build in 1958 of reinforced concrete walls and roofs, by adding on wooden pitched roofs and wooden extentions.

### 3.9 General Evaluation Data

3.9.1 The observations listed below are based on inspecting a small sample of the 1095 World War II wood buildings located at Fort Ord. The 1095 count excludes those wooden structures located on the range. In actual count, twenty-three structures were analyzed following the Attached Selected Building Conditions Survey (SBCS), Appendix A, another approximately thirty or more structures were more casually observed. Obviously, based on this limited sample, the conclusions listed are not presumed to be specific to all conditions. However, it is felt that they are generally reliable and do provide an appropriate basis upon which to develop generic design ideas for future renovations.

3.9.2 The specific buildings that were analyzed following SBCS are as follows, divided into basic construction categories:

<u>Fac.No.</u>	<u>Cat.Code</u>	<u>Current Activity</u>	<u>Flr.Area</u>	<u>Yr.Built</u>
Slab on grade:				
1436	44270	Maintenance	7176	1940
1437	44270	Training	7309	1940
1439	17120	Training	7176	1941
1459	44270	Offices	1162	1941
1461	44270	Offices	1162	1941
1462	44270	Classroom	1162	1941
1647	21410	VehMntShop	3108	1941
2068	73030	Laundry	49140	1941
One Storey Wood Floor:				
1741	72210	Dining	2206	1940
1742	72210	Orderly Room	2206	1940
2531	74068	PX	8175	1941
3003	72410	Off. Qtr.	3245	1941
3005	17120	Offices	3576	1941
4899C	61021	Offices	992	1941
4899E	61021	Offices	3280	1941

Design Evaluation: Fort Ord

<u>Fac.No.</u>	<u>Cat.Code</u>	<u>Current Activity</u>	<u>Flr.Area</u>	<u>Yr.Built</u>
Two Storey Wood Floor:				
2004	72335	Supply Rm.&Classroom	4720	1941
2146	72111	Barracks	4720	1940
2166	72111	Barracks	4720	1940
2202	72111	Offices	4720	1941
2321	72111	Offices	4720	1941
2341	72111	Offices	4720	1941
2546	72111	Barracks	4720	1941
3004	72410	Off.Qtr.	5247	1941



Design Evaluation: Fort Ord

4.0 GENERAL EVALUATION DATA: (based on SBCS form - see Appendix A).

4.1 Roofs

4.1.1 Roofs are pitched with asphalt shingles as the prevalent finish roofing material. Several installations use roll roofing. In general the condition of the roofing shingles is fairly good, although signs of excessive deterioration were observed on "eye brow" projections. Also, multiple layers of asphalt shingles is the norm.

4.1.2 Roof support generally includes some form of a wooden truss. When interior finish is provided, as is typical in all structures except those used for storage and training (e.g. Fac. Nos. 1420's and 1430's) and motor pool (e.g. Fac. Nos. 1640's), and attic space provided.

4.1.3 The attic space is ventilated. While some structures have metal chimney vents, usually the attic is vented by wood lowered openings at the peak of the gable ends.

4.1.4 Most buildings have a roof over hang which is established by extending the rafters. While in storage and training (Fac. Nos. 1420's and 1430's) and motor pool (Cat. Code 21410) buildings the overhangs are nominal, in the enlisted barracks (Cat. Code 72111), Company Headquarters Buildings (Cat Code 14185) and Dining Halls (Cat Code 72210) the overhang has a two and one half to three foot projection. On these latter examples, an overhang is usually also provided along the ends of the building. On the 2-storey barracks, an intermediate overhang, or "eyebrow," is provided above the first floor windows.

4.1.5 Except for occasional gutters or water dams located above entries, no roof drainage is provided. As a result, the perimeter of the buildings often show some signs of erosion. In the worst condition, this erosion has actually undermined the footings on buildings with wood floor above grade or the edge of the slab of those buildings with slab on grade. Generally, however, except for eliminating all vegetation and creating a sand trough around the building perimeter, there appears to be little negative effect from this lack of controlled drainage.

Design Evaluation: Fort Ord

4.1.6 Insulation in the roof was not noticed. Information was provided that recent remodelings have included insulation in the attic space, but this was not confirmed. Those buildings that have not been remodeled recently are uninsulated.

4.1.7 The general condition of the roofs is good. Most roofs do not show signs of bowing or sagging. The most obvious irregularities were apparent at connections between buildings which have been relocated. The connections are either that of joining two separate structures together or the re-joining of a structure which was divided in order to be relocated. Another area of deterioration, which was observed in many buildings, was rotting of the bottom (or last) roof sheathing plank.

4.2 Foundations

4.2.1 Both slab on grade and concrete pads for raised wooden floor are provided.

4.2.2 Concrete slab on grade construction usually entails a 4" to 5" concrete slab poured above existing leveled grade. No turned down slab edges are provided.

4.2.3 With wood floors above grade, the foundation includes only concrete pads which support wood columns. For structures located on soil, the concrete pads include a footing which entails about 6" of concrete 12" to 18" square. For structures that have been relocated onto asphalt paving, the concrete pads merely sit on the asphalt paving.

4.2.4 With wooden floors above grade, the crawl space is usually enclosed with a "skirt" comprised of vertical, spaced wood boards. The bottom edge of the skirt is typically cut to follow the ground slope. The "skirt" is essentially an aesthetic addition to conceal the crawl space.

4.2.5 No insulation was observed.

4.2.6 The general condition of the foundations is good. Except for occasional areas where water erosion has undermined the foundations, the foundations are in satisfactory condition.

## Design Evaluation: Fort Ord

### 4.3 Exterior Walls

4.3.1 Exterior walls are essentially T & G horizontal wood boards on 2x4 wood studs. In the original condition, the exterior finish was merely the wood siding painted. Most buildings remain such, however certain storage buildings have been covered with 4'x8' cement asbestos panels, left unpainted. Several other buildings have been resided with cement asbestos shingles and recently a few have been resided with vinyl beveled cladding.

4.3.2 No insulation was observed. In recent remodelings, insulation is supposed to have been added. This was not confirmed.

4.3.3 The painted finish ranges from poor to good. However, even those buildings with deteriorated finish show little dry rot and apparently are readily prepared for re-painting.

4.3.4 In the original condition, no interior finish was provided. Remodelings have often added interior finish of either wood boards, beaver board, or gypsum wall board. In the latrine areas of barracks, the interior surface of the outside walls is usually plastic laminate paneling except in the shower room where there is ceramic tile.

### 4.4 Interior Walls

4.4.1 Interior wall construction includes either "fixed" wood stud framing with a variety of wall surface materials or "relocatable" wall panels.

4.4.2 "Fixed" partitions are predominantly faced with gypsum wall board. Recent renovations have used gypsum wall board with a textured finish while older additions, which would sometimes utilize beaver board in place of gypsum wall board, would frequently have wood batten strips installed over panel joints. There are also numerous examples of wood wainscoating, but there are usually of older origination.

4.4.3 Added interior partitions were often built through "self-help" programs. As a result, they often appear as temporary, poorly built partitions with questionable aesthetic appeal. This is most prevalent with partitions of beaver board with wood battens.

## Design Evaluation: Fort Ord

4.4.4 "Relocatable" partitions are also predominantly faced with gypsum wall board. Usually these panels had imitation wood veneer facing which, in many situations, has since been painted.

4.4.5 The predominant finish of interior partitions is paint with the condition varying from poor to good. In some instances, while the substrate is very poor, the finish paint is quite acceptable.

4.4.6 The general condition of the interior partitions varies from deplorable (several steps below poor) to good. In some instances, the partitions have holes, some of which extend through the partition. These holes seem to be the result of vandalism. In addition to these holes, the general condition of the wall surface often demonstrates the years of intensive use. It seems that unless there was major renovation, repairs, if done at all, were usually poorly executed.

### 4.5 Ceilings

4.5.1 Except in storage buildings (Cat. Code 44270), motor pool buildings (Cat. Code 21410), and several unrenovated barracks (Cat. Code 72111), most buildings observed have some form of finished ceiling. Usually this entails gypsum wall board installed on the bottom cord of wood roof trusses. Often the joints between the panels are covered with wood battens. In some instances, beaver board rather than gypsum wall board has been used. In the 2-storey barracks, the first floor frequently does not have a ceiling, leaving the wood floor joists and subfloor exposed. In some barracks, gypsum wall board has been installed onto the joists. In the Enlisted Men's Dining Halls, acoustical tile ceilings are usually provided at the non-kitchen end of the structure. The more recently renovated buildings have been provided with either acoustical tile ceilings, especially when the new occupancy is office activity, or with textured gypsum wall board.

4.5.2 Except in the recently renovated structures, the ceiling condition is only average to poor.

4.5.3 In storage buildings (Cat. Code 44270) and motor pool buildings (Cat. Code 21410) the ceiling is merely the exposed wood roof structure. But in the office areas within these buildings, lowered ceilings, usually of gypsum wall board, have sometimes been installed.

## Design Evaluation: Fort Ord

4.5.4 In a number of buildings, a screened panel was installed in the ceiling to provide ventilation to the attic. In these cases, roof chimney vents are provided. Apparently, these originally had an adjustable damper which could be operated by a chain which hung below the ceiling. Several examples are still existent and operable.

### 4.6 Floors

A variety of different finished floor materials were observed including V.A.T., quarry tile, ceramic tile, carpet, and exposed concrete.

4.6.1 The most prevalent finished floor material utilized is V.A.T. installed over plywood subfloor. Frequently numerous layers of flooring have been installed. However, except in some buildings that have been recently renovated, the condition of the finished floor is only average to poor. This includes some of the newly renovated buildings. The poor condition is in terms of worn tiles, patched floors and warped subfloors. While the finish floor and subfloor might not be good, this did not seem to be associated with any structural deterioration.

4.6.2 In the Enlisted Men's Dining Halls, a quarry tile finished floor is provided in the kitchen and at the food service areas. In those cases observed, the quarry tile condition is good to average.

4.6.3 In the barracks buildings, even though the floors are primarily wood, a concrete slab is provided in the latrine, in the mechanical room, and at the side door entry. This concrete slab is either a slab on grade or is a slab installed on a raised wood floor which has extra support.

In the latrine areas, especially in the shower rooms, ceramic tile has been installed over the concrete subfloor. However, in some barracks, the concrete floor is the finished condition in the latrine. In those cases observed, the ceramic tile is in good to average condition.

4.6.4 Various installations of carpet were observed. This includes the sleeping areas, in recently renovated barracks, and the lounge areas in barracks that have been converted to classroom use. In buildings that have been converted into office use, carpet is often used throughout. The carpet usually has been installed over existing V.A.T. or on concrete. The general condition of the carpet varies from good to poor, but cleanliness is often lacking. This was most apparent in Building T2341 which has only recently been renovated.

## Design Evaluation: Fort Ord

4.6.5 In slab on grade structures, the finished floor is often merely the exposed concrete, sometimes painted, but usually not. The condition of the finished surface is what would be expected after 40-plus years of use.

In the buildings which were originally horse barns and are now used for storage and training (Fac. Nos. 1420's and 1430's), the concrete floor had drainage troughs. In some instances, these have been filled in and in others left as was.

4.6.6 While the finished floor varies in terms of material and in terms of condition, from good to poor, in general, the structural condition of the flooring is satisfactory.

### 4.7 Windows

4.7.1 The standard window is a double hung wood window with single glazed 8 lites over 8 lites. The windows do not have counterweights so they rely on various devices to remain opened.

4.7.2 In the latrines, wood awning windows with obscured glazing are used.

4.7.3 The general condition of the windows varies from good to poor. In most instances, the windows are not well-fitted and are leaky and would benefit from being weatherstripped.

4.7.4 The windows in the enlisted men's dining hall are provided with insect screens. Windows in certain storage buildings and in offices that are to be secured are provided with chain link security screens. But generally, the windows do not have any screening.

4.7.5 In some conditions, damaged windows which are missing mutten bars have been repaired by being reglazed with double sized lites.

### 4.8 Doors

4.8.1 The standard doors are either wood panelled doors or solid core, flush wood doors installed in wood door frames. The flush doors appear to have replaced panelled doors. The hardware used is essentially residential, cylindrical, passage sets. No examples of mortise locks or panic hardware were observed.

## Design Evaluation: Fort Ord

4.8.2 The original exterior doors appear to have been wood panelled doors with upper glazed panels. In a number of buildings observed, these glazed doors still remain. However, when replaced, unglazed, flush, solid core, wood door have been used.

4.8.3 In some structures which apparently have been "improved" previously with self help, a variety of wood doors including wood panelled doors and hollow core flush doors have been used. In certain locations, interior doors have been installed as outside doors and have deteriorated.

4.8.4 In barracks which are divided into private rooms by use of "relocatable" portions, the doors are not provided with passage sets. They only have key operated, cylindrical sets.

4.8.5 In barracks which are divided into private rooms, often a variety of locking devices have been added to provide additional security.

4.8.6 The fit, operation and condition of the doors is average to poor. No installations of weatherstripping were observed. In the barracks, some doors showed signs of damage, apparently from forced entry that has only been superficially repaired.

## 4.9 Electric Lighting

4.9.1 While there are a few buildings where the original incandescent lighting is still in use, fluorescent lighting is the predominant source of interior illumination. Usually, surface mounted luminaires with plastic lenses are used. In recently renovated buildings which have exposed tee, hung ceilings, recessed fluorescent luminaires are sometimes used.

4.9.2 The electric lighting levels vary. In most activity areas, the level is adequate.

4.9.3 No installations of emergency lighting were observed.

4.9.4 The predominant means of controlling lighting is by individual room switching.

4.9.5 In general, the fixture condition and the fixture cleanliness is good.

## Design Evaluation: Fort Ord

### 4.10 Daylighting

4.10.1 The quality of daylighting that is available in most of the World War II wooden structures is one of the major positive attributes that these structures have to offer. Except for buildings that were originally built for storage (and even in these structures windows have often been added), double hung, wood windows were located approximately 10'-0" on center along the building perimeter. Since the typical building depth is only 30'-0", this provides very good conditions for effective daylight illumination in all occupied areas.

4.10.2 The predominant window orientation is east and west.

4.10.3 Normally, no window shading is provided other than the roof or "eyebrow" overhangs.

4.10.4 In latrine areas, the windows were elevated and usually glazed with frosted glass so privacy is provided.

### 4.11 H.V.A.C.

4.11.1 Heating of the interior spaces is accomplished in one of three ways: 1) steam heating in cast iron radiators with steam supplied from gas fire boiler central to a complex of buildings, 2) warm air heating from residential type, gas fired furnaces supplied either from the ceiling or from the central corridor area, and 3) gas fired space heaters.

4.11.2 Due to the mild summer conditions that are prevalent in the Monterey Bay area and the convenience of operable windows in the typical World War II wood buildings, air conditioning, which is not required for comfort control, is not provided. Several installations of window air conditioning units were observed, which are used for temperature control in computer rooms.

4.11.3 Ventilation is achieved by operable sash. In latrine areas, exhaust fans are provided. However, they are not all operative.

4.11.4 In general, except for those buildings which are heated by steam in perimeter located, cast iron radiators, there seems to be a lack of appreciation by the building occupants for the heating system. In those buildings which are heated with space heaters, the complaints seem to be justified since often remodeling of the building has subdivided spaces without concern for heat distribution.



## Design Evaluation: Fort Ord

As a result, not all spaces are now provided with a heat source. In buildings heated by a central warm air system, complaints were usually in terms of uneven air distribution and of cold drafts along the floor. Since the original installation, as with buildings with space heaters, was often for an undivided space, subsequent subdivisions have resulted in an unbalanced distribution. Also, since the numerous windows are not weatherstripped and since the raised floors are not insulated, heating from the ceiling does not adequately produce comfort conditions even in a temperate climate such as enjoyed at Fort Ord.

4.11.5 In the 2-storey barracks buildings, separate furnaces seem to be provided for each floor.

4.11.6 As observed, supply air ducts in the mechanical rooms are insulated. However, distribution ducts in the barrack are not insulated.

4.11.7 Return air is from a common inlet. In buildings which have been subdivided, transfer grilles to the corridor were occasionally observed.

### 4.12 Electrical Service

4.12.1 From both observations and discussions with building users, it appears that the electrical service to the various buildings is adequate. Where inspected, service is controlled with circuit breaker panels.

4.12.2 Electrical outlets and wiring are both recessed in the walls, as is the condition in recently renovated buildings, and surface mounted. While a particular examination of existing outlets was not pursued, it was generally observed that there is a prevalent use of grounded circuits. However, the number and placement of outlet is often inadequate.

### 4.13 Plumbing

4.13.1 In many of the buildings inspected, there is no plumbing provided. However, in the 2-storey barracks, whether still used for housing or converted to other uses such as offices or classroom, the latrines remain in use. In the Enlisted Personnel Dining Halls still functioning as such, plumbing for kitchen purposes is provided, but no water closets. In Enlisted Personnel Dining Halls which have been converted to other uses, there is no longer operable plumbing.

4.13.2 The condition of the plumbing fixtures range from good to poor.

## Design Evaluation: Fort Ord

4.13.3 The latrines in the 2-storey barracks comprise the major example of plumbing. Two arrangements are provided: those with a latrine only on the first level and those with a latrine on each floor. With the latter arrangement, none of which were observed, each latrine is provided with 4 lavatories, 2 urinals, 3 water closets, a gang shower room with 3 shower heads, and 1 slop sink. In the barracks with only one latrine, 6 lavatories, 3 urinals, 4 water closets, a gang shower room with 3 shower heads, and 1 slop sink are provided. Variations in these counts are probable. Also, while not observed, gang urinals in lieu of individual, wall hung urinals are apparently still used in some locations.

4.13.4 Supply piping is generally galvanized steel although several installations of copper piping were observed within buildings.

4.13.5 Due to environmental conditions, copper is not an appropriate material to be used, especially when placed in the soil. For this reason, galvanized steel piping continues to be used for water distribution.

4.13.6 In general, water flow seemed adequate.

4.13.7 Hot water is provided to residential buildings and to dining halls. It is no longer supposed to be provided to other structures and was not generally observed.

4.13.8 Drainage piping is predominantly galvanized steel within buildings and cast iron outside, i.e. below the floor and underground. Recent repairs and remodeling seems to use plastic piping for drainage.

4.13.9 Several conditions of corroded cast iron drainage piping outside of the buildings were observed. While not particularly addressed, there were comments raised that the underground systems serving the World War II buildings have deteriorated and require replacement.

### 4.14 Stairways

4.14.1 Stairways are typically wood with metal nosings and pipe handrails installed on one side.

4.14.2 In building T3004 the stair to the second floor was located in the center of the building and was provided with a window at the second floor level. In the typical 2-storey barracks, however, the stair is located at the latrine end of the structure, about 10'-0" from the end wall. At the bottom of the stair there is a door to the exterior, sometimes with a glazed panel.

NO-A194 989

EVALUATION AND GUIDELINES FOR THE USE OF TEMPORARY WOOD

2/2

BUILDINGS AT US A (U) CONSTRUCTION ENGINEERING

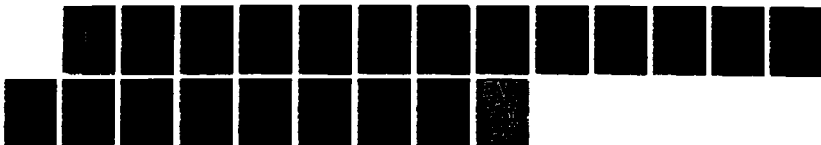
RESEARCH LAB (ARMY) CHAMPAIGN IL D REED ET AL APR 88

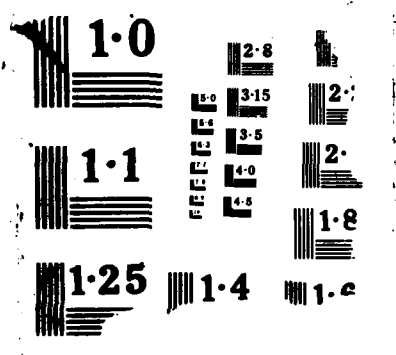
UNCLASSIFIED

CERL-TR-N-88/06

F/G 15/5

NL





## Design Evaluation: Fort Ord

4.14.3 At the top of the stairs, no closure is provided. At the bottom of the stairs, doors are provided from the stair landing both to the latrine and to the barracks area. The doors are not labeled.

### 4.15 Entry

4.15.1 While several examples of added covered entries were observed, in general, except for the roof or "eyebrow" overhang, no overhead protection is provided at building entrances.

4.15.2 In general, vestibules are not provided. In the 2-storey barracks there is the concrete floor area at the side entry doors plus the passage to the central corridor which provides a buffer zone, but this does not really constitute a vestibule.

4.15.3 In slab on grade buildings, the entry is on grade. In buildings with the floor above grade, entry is typically by wooden steps. The only raised entry observed that is provided with ramp access is at building T3005, the Civilian Employment Office.

4.15.4 In some of the buildings that have been remodeled recently for office use, a reception area has been provided. However, the typical condition does not include such an area.

4.15.5 Directories, if provided, tend to be located outside of the building and usually are related to military personnel moral. Information as to the occupancy or occupants of a building is generally not clearly identified. As a result, to the uninitiated, movement on the post is somewhat restricted.

### 4.16 Handicapped Access

4.16.1 Handicapped access is generally not provided in the World War II buildings except for those with slab on grade construction. The only observed exception was building T3005, the Civilian Employment Office.

### 4.17 Overall Evaluation

4.17.1 The overall evaluation of the World War II buildings ranges from very good to very poor. However, the basic structural shell and building enclosure, which would essentially be the only aspect of these structures which would remain "as is" if they are to be renovated for future use, are sound.

Design Evaluation: Fort Ord

4.18 Issues

4.18.1 Fire Egress: Typically, the 2-storey barracks structures are provided with a door leading to a wooden ladder which serves as a second means of egress from the 2nd floor. This is located at the end of the structure remote from the interior stairs. On the first floor, an egress door is provided below the second floor egress. In some instance, instead of a wooden ladder a wooden stairway is provided. In 1-storey structures, fire egress is provided by multiple exterior doors. In the rare location where fire egress is marked, signs are not illuminated.

4.18.2 Smoke Detectors: Most buildings observed have some form of smoke detection. Various forms of detectors were observed. The older installations are "central" systems, but occasionally, apparently inoperative. Newer installations, which are individual, battery operated units, also are sometimes inoperative.

4.18.3 Fire Extinguishers: Fire extinguishers are regularly provided.

4.18.4 Sprinklers: Not observed except in building 2068, the laundry.

4.18.5 Telephones: Offices are provided with phones, but enlisted personnel facilities are not. Pay phones are usually located outside.

4.18.6 Garbage Storage: As observed, garbage is stored in dumpster units which are commercially serviced.

4.18.7 Laundry: Barracks are provided with residential style washers and dryers. These are sometimes located on the second floor at the top of the stairs, and sometimes in the latrine.

4.18.8 Water Fountain: Water fountains are frequently provided. However, they often operate improperly or are inoperative.

4.18.9 Janitor's Closet: Janitor's Closets are not regularly provided. However, slop sinks are located in barracks buildings and in dining halls.

4.18.10 Storage: Storage space within the World War II structures is limited.

4.18.11 Mechanical Room: The 2-storey barracks buildings usually have a mechanical room, with exterior access, adjacent to the first floor latrine. In 1-storey structures which have central warm air heating, mechanical rooms are also provided. Otherwise, none are provided.

Design Evaluation: Fort Ord

4.18.12 Exterior landscaping: The lack of any significant exterior landscaping was most apparent throughout the post. The investigating team feels that considerable advantage would be gained by effective landscaping.

4.18.13 Paths: Typically, the World War II buildings are surrounded with asphalt paving. In those instances where cross drives are not provided, walkways are.

4.18.14 Parking: The post supposedly has a total of 960,774 square yards of asphalt paving for parking. Based on approximately 40 square yards per vehicle, this would accommodate 24,000 vehicles. Since this must also accommodate military vehicles, it is not readily feasible to determine the parking spaces available for personnel. In general, however, there appeared to be reasonable parking provided. Unfortunately, it is usually provided in vast areas of blacktop without any vegetation or subdivision.

4.18.15 Building Security: Security is generally provided only at a nominal level.

4.18.16 Acoustics: In general, the acoustical isolation between spaces within the World War II structures is very limited. Even in recently remodeled buildings, acoustic privacy is lacking. Sound transmission results from partitions not being adequately sealed, of being light weight, and having numerous openings (i.e. doors, levers, and holes created by vandalism). In recent renovations where hung acoustical tile ceilings have been installed, new partitions may not extend to the structure.

Design Evaluation: Fort Ord

## 5.0 USER EVALUATION

### 5.1 User Classification

Users of the World War II buildings at Fort Ord can be divided into those who actually occupy these buildings and those who are responsible for maintaining or renovating them.

5.1.2 While members of the latter group often are also included under the first definition, their evaluations in terms of their assignment to the latter group tend to be more generalized than that from the first. However, the overlap is an important factor.

5.1.3 Of those that actually occupy the World War II buildings, two significant distinctions are also apparent. There is a sub-group which tends to merely be receivers of the structures and there is a group that tends to accept responsibility for the structures and actively participate in actually improving conditions.

5.1.4 This division of "users" can be shown as follows:

#### I. Occupants

- a) non-improvers
- b) improvers

#### II. Maintainers

- a) non-occupants
- b) occupants

### 5.2 Occupants' Evaluations

5.2.1 Generally, it was clear that those occupants who do not assume direct responsibility for maintaining and improving their World War II buildings had more complaints about space conditions than those that do. In fact, the difference in attitude was not necessarily related to the observed quality of the physical conditions. That is, greater satisfaction was often expressed when the occupants were in a deteriorated structure for which some responsibility for maintenance was accepted than that expressed by occupants in better structures.

5.2.2 Occupant evaluations are obviously effected by comparisons, which might be in part the basis for the previous observation. For example, in several instances when enlisted personnel were asked how they rated their living accommodations, accommodations which the investigating team felt were inadequate, they said that they were "pretty good". On further inquiry, it was understood that the enlisted personnel were saying that they were better than their previous quarters.



## Design Evaluation: Fort Ord

### 5.2.3 Positive Aspects of World War II Buildings:

- Space allocation tends to be more generous in World War II buildings than in "permanent" buildings.
- The smaller World War II buildings provide a better sense of autonomy than is available in the larger, "permanent" buildings.
- The World War II buildings offer better user control over lighting, heating, etc.
- The numerous operable windows provide good daylighting, visual release, and beneficial cooling breezes.
- When cleaned up and painted, the World War II buildings are aesthetically attractive.
- The World War II buildings are very flexible and can be readily altered to accommodate a variety of activities.
- The World War II buildings adequately meet the spatial demands, i.e., they "work".
- When maintained properly and/or when renovated, the condition of the World War II buildings is very good and easily comparable to or better than that provided in "permanent" structures.

### 5.2.4 Negative Aspects of World War II Buildings:

- The condition of the World War II buildings is poor.
- The World War II buildings are old and are not as "nice" as the newer buildings.
- The heating systems are not adequate, especially in terms of "cold draughts along the floor" and rooms without any or not enough heat.
- In many of the World War II buildings, there are no toilet facilities or water access (e.g. for making coffee).

Design Evaluation: Fort Ord

5.3 Maintainer's Evaluations

5.3.1 The interviews with the group classified as "Maintainers" tended to include those who are also occupants of World War II buildings. From innuendos, it seems that this group has a more positive appreciation for the World War II buildings than those who are responsible for the maintenance of the physical plant on the post but have their offices in "permanent" buildings.

5.3.2 Positive Aspects of World War II Buildings:

(specific occupant comments are listed under 5.2.3.)

- The structural shells of the World War II buildings are essentially very sound and can accommodate considerable use, abuse, and modification.
- The World War II buildings are very flexible.
- The World War II buildings that are 1-storey with wood floors above grade are readily relocatable.
- The maintenance of the World War II buildings is relatively simple and does not require excessively specialized talents, equipment, or materials.
- The required amount of ongoing maintenance of the World War II buildings is comparable to that required in "permanent" buildings.
- In the Monterey Bay area, the use of wood, especially redwood which was used in the World War II buildings at Fort Ord, is an appropriate choice for building construction due to the environmental conditions of high humidity, ocean breezes, temperate climate, etc.

5.3.3 Negative Aspects of World War II Buildings

(specific occupant comments are listed under 5.2.4).

- Some of the World War II buildings have deteriorated so much that they no longer are worthwhile maintaining or renovating.

## Design Evaluation: Fort Ord

- The World War II buildings need to be painted on a regular basis.
- The World War II buildings need more repair than the newer buildings.

### 5.4 Martinez Hall Commentary

5.4.1 Martinez Hall, Facility Number P2798, is a concrete building, with a basement, concrete walls, and tile roof. Although built only in 1941, Martinez Hall has been identified as an historic building due to its architectural character and its former use as Command Headquarters during World War II. Today it serves as the Reception Center for military personnel and their dependents when arriving at Fort Ord. The category code for Martinez Hall is 61050, appropriately identifying it as an administrative office.

5.4.2 Martinez Hall has just been totally renovated. The occupants of the renovated structure are the same people/functions as those that used the building before renovation. During the construction period, these people/functions were relocated into World War II structures.

5.4.3 In talking with various individuals who occupied Martinez Hall prior to the renovation, were then temporarily relocated in World War II structures, and now have returned to the renovated facility, we were consistently told that the quality of the space provided in the World War II buildings was superior to that provided in Martinez Hall, even after renovation! This was true even though only minimal work was done to facilitate their relocation into the World War II buildings, which apparently were open bay, 2-storey enlisted personnel barracks.

5.4.4 When queried as to the particular advantages provided in the World War II buildings, the following were mentioned:

- A more generous allocation of floor area was provided in the World War II buildings than is provided in Martinez Hall (the investigating team did not measure or determine the specific floor area allocated in the two situations, but we did observe considerable crowding in the open office area of the remodeled Martinez Hall. However, some private offices in Martinez Hall also were very spacious).

## Design Evaluation: Fort Ord

- The spacial character of the World War II buildings seemed more open and less confining.
- There was less commotion in the World War II buildings because the various units which operate in the Reception Center were separated into their own facilities.
- While the various units were not "under one roof" during the temporary relocation as is now provided, circulation between units was easy and convenient. All the World War II buildings were apparently in proximity to each other. Although movement between units required going outside, this was more direct than presently required by the maze of corridors in Martinez Hall.
- The building services (e.g. heating, lighting, plumbing) in the World War II buildings were very adequate. The convenience of cross ventilation through the World War II buildings was appreciated.

5.4.5 In discussing the relative merits of their present facility verses the World War II temporary facilities, it was suggested that the occupants of Martinez Hall were not directly involved in the renovation planning. Rather, it was claimed that the building was renovated and then they, the current users, had to determine how best they might utilize the refurbished space.

Design Evaluation: Fort Ord

6.0 CONCLUSIONS

6.1 Suggested Construction

6.1.1 The basic conclusion derived from the evaluation of World War II buildings conducted at Fort Ord is that World War II structures offer a major resource for present and future space needs. Although these structures are classified as temporary, their continued, effective utilization for more than 45 years suggests that such classification is inappropriate and unjustified. Unfortunately, because of this classification, certain actions relative to these structures are discouraged or even prohibited. While in the Monterey Bay area these structures tend to survive well "on their own", the temporary classification has had a certain self-fulfilling effect, which might have more deleterious impact in other locations.

6.1.2 In proposing that the World War II wood buildings have considerable potential for future use, it is accepted that these buildings are effectively only "structural shells" which must be refurbished adequately.

6.1.3 In the 45 years since these World War II wood buildings were originally built, there has been considerable advancement in certain construction standards. Most of these changes have been in terms of mechanical services, thermal insulation and interior finishes.

6.1.4 Most of the World War II structures have had some form of improvement made to their mechanical services, such as replacing furnaces, replacing plumbing fixtures, upgrading electrical service and lighting, since their original construction. But after 45 years, major or even total replacement would not be unreasonable. Therefore, it is recommended that any proposed renovation recognize that patching or minor adjustments to the mechanical services probably will not be adequate.

6.1.5 The World War II wood buildings were originally constructed without any interior wall finish or any insulation. Also finished ceilings were not always installed. While interior finishes on the exterior walls and on the ceilings have generally been added at some time during the last 45 years, this often was not done according to current standards. For instance, during "Bruckerization" in the 1960's only 1/8" gypsum wall board rather than 1/2" was apparently installed. It is recommended that any proposed renovation approach the World

Design Evaluation: Fort Ord

War II buildings essentially as structural shells. Insulation should be installed above the ceiling below the roof, maintaining the vented attic space, and a new finished ceiling should be installed. Exterior wall framing should be exposed, unless the existing interior finish is deemed adequate by current construction standards, insulated, and new interior finish installed. During this process electrical wiring should be upgraded or replaced. In buildings with above grade construction, the exposed floor should be insulated.

6.1.6 All existing, double hung, wood windows should be repaired as required to achieve the original condition and should be weather-stripped. In Monterey Bay's temperate climate, double glazed windows are not justified, however, in a more extreme climate, replacement with new insulated, wood, double hung windows would be appropriate.

6.1.7 As required, the roofs should be re-shingled. If more than two layers of shingles already exist, they should be removed before re-roofing. All deteriorated roof sheathing should be replaced, with particular concern given to the bottom board. If the building does not require re-roofing at the time of renovation, re-roofing should be "scheduled" at the appropriate time rather than assumed as not required. The life expectancy of shingled roofs is limited.

6.1.8 The exterior wood siding, windows, and trim should be repainted as needed. If repainting is not required at the time of renovation, painting should be "scheduled" at the appropriate time rather than assumed as not required. Before repainting, any deteriorated exterior finish should be replaced with matching material.

6.1.9 In lieu of repainting the exterior wood siding, installation of vinyl lapped siding might be considered. However, this is not strongly recommended since such installations can result in complications and would alter the appearance of the buildings. Also, it is not clear that it would be cost effective over the life of the installation. While such installations often are cost effective, normally the analysis is based on comparison between alternative installations rather than maintenance of already existing, high quality redwood.

6.1.10 Having refurbished the "structural shell" and upgraded the mechanical services, the World War II wood structures can be re-used for a variety of activities which would effectively benefit from the quality of space, the adaptability, and the aesthetical appeal that these structures provide.

## Design Evaluation: Fort Ord

6.1.11 Particular adjustments to these structures should be designed for the intended activity. For example, if barracks structures are to be used for offices, remodeling of the latrine to provide both men and women toilets would be proper. If private offices are required, the interior area must be subdivided.

6.1.12 In refinishing the interiors, selection of materials should be based appropriately on functionality, aesthetics, and cost. Patching of existing finishes should be undertaken only if such repairs will not be apparent and will have a life expectancy equal to that of the renovation.

6.1.13 As part of any renovation, consideration should be given to handicapped access and, in the 2-storey barracks buildings, fire egress. It is believed that both can be achieved readily. Effective consideration of these issues should produce innovative proposals which will enhance the potential of the World War II buildings.

### 6.2 Suggested Future Uses

6.2.1 There are numerous activities which can be effectively accommodated in the World War II wood buildings including those for which these structures were originally constructed, the current uses, and new uses.

6.2.2 An obvious use is as housing for military personnel. With renovation, not only opened or partitioned barracks with a common latrine, but also private rooms with individual baths or even apartments could be developed. And, perhaps in their present location or with relocation, the structures could be converted effectively into family housing units. These structures might also provide special housing for visitors to the post or for participants in special training or conference programs. Their unique character, developed with effective renovation and landscaping, would offer a very special opportunity. And they can also provide a resource for emergency mobilization housing.

6.2.3 The World War II buildings have been effectively used for office activity, often with only nominal physical modifications. Continued use in this capacity seems reasonable.

## Design Evaluation: Fort Ord

6.2.4 Some of the World War II buildings, especially those with slab on grade construction, were constructed for particular maintenance activities and others have been modified to accommodate such. Their continued use as specialized facilities for maintenance and/or training seems reasonable, especially if provided with updated mechanical service.

6.2.5 The World War II buildings have been and are currently used for classrooms. It seems reasonable that this type of use be continued.

### 6.3 Historical Significance

6.3.1 The investigating team believes that the World War II wood buildings have historic significance which should be recognized, appreciated, and utilized. The buildings generally provide a good architectural image in terms of building scale, form and materials. The site arrangement of these structures is related to an extensive tradition of military planning. But, even more important than their significant architectural attributes and their connection with military planning typology, these buildings are a physical monument to an extraordinary time in American history and to the men and women who dedicated their lives to protect American ideals. The World War II buildings should be recognized for the important and positive military image that they provide. These buildings have served effectively in the past and can continue to do so in the future.



Annex A

SELECTED BUILDING CONDITIONS SURVEY  
(Revised October 6, 1986)

Building No.: \_\_\_\_\_

Building Type: \_\_\_\_\_ Year Built: \_\_\_\_\_

Use: Original: \_\_\_\_\_ Past: \_\_\_\_\_

Current: \_\_\_\_\_ Recommend: \_\_\_\_\_

Activities: \_\_\_\_\_

Number of Occupants: Military: \_\_\_\_\_ Civilian: \_\_\_\_\_

Floor Area: \_\_\_\_\_ SF No. of Floors: \_\_\_\_\_

ROOF:

Pitched Flat Overhang Attic

Materials: B.U.R. Shingles Roll Roof. Metal Other \_\_\_\_\_

Date of Last Reroofing: \_\_\_\_\_

Drainage: None Gutters/DS Internal Other \_\_\_\_\_

Insulation: Yes No Type: \_\_\_\_\_

General Conditions: Poor Average Good Not Access.

Sag/Bow Ponding Leaking Repairs

Comments: \_\_\_\_\_

FOUNDATION:

Slab on Grade Piles Footings Basement

Materials: Concrete Masonry Wood Other \_\_\_\_\_

Condition: Original Replaced Relocated

Insulation: Yes No Type: \_\_\_\_\_

Crawl Space: Yes No Enclosed Vapor Barrier Vent.

General Conditions: Poor Average Good Not Access.

Annex A

Settlement      Erosion      Leaking      Water      Repairs

Comments: \_\_\_\_\_

EXTERIOR WALLS:

Materials: Ext. \_\_\_\_\_ Wall \_\_\_\_\_ Int. \_\_\_\_\_

Insulation: Yes      No      Type: \_\_\_\_\_

Painted: Yes      No      Condition: Poor      Avg      Good

General Conditions: Poor      Average      Good      Not Access.

Stain/Discolor      Graffiti      Vandalism      Repairs

Comments: \_\_\_\_\_

INTERIOR WALLS:

Materials: Surface \_\_\_\_\_ Wall \_\_\_\_\_ Surface \_\_\_\_\_

Finish: Paint      Paper      Natural      Condition: P      AV      G

General Condition: Poor      Average      Good      Not Access.

Stain/Discolor      Cracks      Deterioration      Repairs

Comments: \_\_\_\_\_

CEILINGS:

Materials: \_\_\_\_\_

General Conditions: Poor      Average      Good      Not Access.

Stain/Discolor      Deflection      Cracks      Repairs

Comments: \_\_\_\_\_

FLOORS:

Materials: \_\_\_\_\_

Finish Conditions: Poor      Average      Good      Not Access.

**Annex A**

General Conditions: Poor Average Good Not Access.

Stain/Discolor Wear Buckling Sagging Not Access.

Comments: \_\_\_\_\_

**WIDOWS:**

Materials: \_\_\_\_\_

Inoperable Operable Screens Number: \_\_\_\_\_

Fit Conditions: Poor Average Good Not Access.

Operation Conditions: Poor Average Good Not Access.

General Conditions: Poor Average Good Not Access.

Broken Glass Boarded-Up Repairs Weatherstripped

Comments: \_\_\_\_\_

**DOORS:****Exterior****Interior****Fire**

Door Materials: \_\_\_\_\_

Frame Materials: \_\_\_\_\_

Hardware: \_\_\_\_\_

Number: \_\_\_\_\_

Fit: P AV G P AV G P AV G

Operations: P AV G P AV G P AV G

Conditions: P AV G P AV G P AV G

Comments: \_\_\_\_\_

**ELECTRIC LIGHTING:****General****Corridors****Stairs****Other**

Type: \_\_\_\_\_

Light Level: \_\_\_\_\_

# Annex A

Glare: \_\_\_\_\_

Emgncy. Ltg.: \_\_\_\_\_

Switching: Rm/Rm Panel Rm/Rm Panel Rm/Rm Panel Rm/Rm Pnl

Fixture  
Cond.: P AV G P AV G P AV G P AV G

Fixt. Clean: P AV G P AV G P AV G P AV G

## DAYLIGHTING:

	<u>General</u>	<u>Corridors</u>	<u>Stairs</u>	<u>Other</u>
Adequacy:	P AV G	P AV G	P AV G	P AV G
Control:	S B C OH	S B C OH	S B C OH	S B C OH

(S-shades, B-blinds, C-curtains, OH-overhang, \_\_\_\_\_)

## H.V.A.C.

Type of System: \_\_\_\_\_

Heating: Steam Hot Water Air Electric

Cooling: Chilled Water Air Ind. Units

Ventilation: F.A. \_\_\_\_\_

Exhaust \_\_\_\_\_

Fuel: \_\_\_\_\_

General Conditions: Poor Average Good Not Access.

Noise Level: \_\_\_\_\_ Draft: \_\_\_\_\_

User Control: \_\_\_\_\_ Maintenance: \_\_\_\_\_

Comments: \_\_\_\_\_

## ELECTRICAL:

Service Amp.: \_\_\_\_\_ Control: \_\_\_\_\_

Wiring: \_\_\_\_\_ Grounded Outlets: \_\_\_\_\_

Outlet Spacing: \_\_\_\_\_ Switching: \_\_\_\_\_

# Annex A

No. of Circuits:\_\_\_\_\_ Circuit Loading:\_\_\_\_\_

Comments:\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## PLUMBING:

	<u>Number</u>	<u>Conditions</u>			
Toilets	_____	Poor	Average	Good	Not Access.
Urinals	_____	Poor	Average	Good	Not Access.
Lavatories:	_____	Poor	Average	Good	Not Access.
Showers:	_____	Poor	Average	Good	Not Access.
Tubs:	_____	Poor	Average	Good	Not Access.
Slop Sink:	_____	Poor	Average	Good	Not Access.
Hose Bibb:	_____	Poor	Average	Good	Not Access.
Floor Drains:	_____	Poor	Average	Good	Not Access.
Drinking Fountains:	_____	Poor	Average	Good	Not Access.
Supply Piping:	Copper	G.S.	Plastic	Insulated	
Drain/Storm:	Copper	G.S.	C.I.	Plastic	
Water Flow:	_____	Hot Water:_____			
Drainage:	_____	Rust:_____			
Exhaust:	_____				
Comments:	_____				
_____					

## STAIRWAYS:

Materials:\_\_\_\_\_

Handrails:\_\_\_\_\_ Fire Doors:\_\_\_\_\_

Window:\_\_\_\_\_ Direct Ext. Access:\_\_\_\_\_

**Annex A**

Conditions: Poor Average Good Not Access.

Comments: \_\_\_\_\_

**ENTRY:**

Covered Entry: \_\_\_\_\_ Vestibule: \_\_\_\_\_

Type: Grade Steps Ramp \_\_\_\_\_

Reception Area: \_\_\_\_\_ Directory: \_\_\_\_\_

Comments: \_\_\_\_\_

**HANDICAP ACCESS:**

To 1st Floor: Yes No To Upper Floors: Yes No

Method: \_\_\_\_\_

**OVERALL:**

Building Conditions: Poor Average Good

Comments: \_\_\_\_\_

**ISSUES:**

Fire Egress

**Annex A - page vii**

Smoke Detectors

Fire Extinguishers

Sprinklers

Telephones

Garbage Storage

Laundry

Water Fountain

Janitor's Closet

Annex A

Storage

Mechanical Room

Exterior Landscaping

Paths

Parking

Building Security

Acoustics

SCHEMATIC PLAN:

## ENS Team Distribution

Chief of Engineers  
ATTN: DAEN-ZCF-U  
ATTN: CEEC-M (2)  
ATTN: CEEC-ZA

HQFORSCOM 30330

US Army Engineer District  
New York 10278  
ATTN: Chief, Design Br.  
Pittsburgh 15222  
ATTN: Chief, Engr Div  
Philadelphia 19108  
ATTN: Chief, NAPEN-E  
Baltimore 21203  
ATTN: Chief, Engr Div  
Norfolk 23510  
ATTN: Chief, NAOEN-R  
Huntington 25721  
ATTN: Chief, ORHED-P  
Wilmington  
ATTN: Chief, SAWEN-PP 28401  
ATTN: Chief, SAWEN-PM 28401  
ATTN: Chief, SAWEN-E 28402  
Charleston 29402  
ATTN: Chief, Engr Div  
Savannah 31402  
ATTN: Chief, SASAS-L  
Jacksonville 32232  
ATTN: Env. Res. Br.  
Mobile 36628  
ATTN: CESAM-PD-ER/ME  
Nashville 37202  
ATTN: Chief, ORNED-P  
Memphis 38103  
ATTN: Chief, LMMED-PR  
Vicksburg 39180  
ATTN: Chief, Engr Div  
Louisville 40201  
ATTN: Chief, Engr Div  
St. Paul 55101  
ATTN: NCSPD-ER  
Chicago 60604  
ATTN: Chief, NCCPD-ER  
ATTN: Chief, NCCPE-PES  
St. Louis 63101  
ATTN: Chief, ED-B  
Kansas City 64106  
ATTN: Chief, Engr Div  
Omaha 68102  
ATTN: Chief, Engr Div  
Little Rock 72203  
ATTN: Chief, Engr Div  
Tulsa 74121  
ATTN: SWTED  
Fort Worth 76102  
ATTN: Chief, SWFPL-R  
ATTN: Chief, SWFED-F  
Galveston 77553  
ATTN: Chief, SWGAS-L  
ATTN: Chief, SWGCO-M  
Albuquerque 87103  
ATTN: Chief, Engr Div  
Los Angeles 90053  
ATTN: Chief, SPLED-E  
San Francisco 94105  
ATTN: Chief, Engr Div  
Sacramento 95814  
ATTN: Chief, SPKED-D  
Far East 96301  
ATTN: POPED-L  
Seattle 98124  
ATTN: Chief, NPSEN-PL-WC  
ATTN: Chief, NPSEN-PL-ER  
ATTN: Chief, NPSEN-PL-BP  
Walla Walla 99362  
ATTN: Chief, Engr Div  
Alaska 99506  
ATTN: NPAEN-G-M

US Army Engineer Division  
New England 02154  
ATTN: Laboratory  
ATTN: Chief, NEDED-E  
South Atlantic 30303  
ATTN: Chief, SADEN-E  
Huntsville 35807  
ATTN: Chief, HNDED-CS  
ATTN: Chief, HNDED-M  
Lower Mississippi Valley 39180  
ATTN: Chief, PD-R  
Ohio River 45201  
ATTN: Chief, Engr Div  
North Central 60605  
ATTN: Chief, Engr. Planning Br.  
Southwestern 75242  
ATTN: Chief, SWDCO-O  
South Pacific 94966  
ATTN: Laboratory  
Pacific Ocean 96858  
ATTN: Chief, Engr Div  
ATTN: Chief, PODED-P  
North Pacific  
ATTN: Laboratory 97060  
ATTN: Chief, Engr Div 97208

5th US Army 78234  
ATTN: AKFB-LG-E

7th US Army 09407  
ATTN: AETTM-DTT-MG-EH

172nd Infantry Brigade 98733  
ATTN: AFZT-FG-EH

US Army Western Command 96858  
ATTN: APRM-MC

USA ARRADCOM 07801  
ATTN: DRDAR-LCA-OK

West Point, NY 10996  
ATTN: Dept of Mechanics  
ATTN: Library

Ft. Belvoir, VA 22060  
ATTN: Learning Resources Center

Ft. Lee, VA 23801  
ATTN: AMXMC-D (2)

Ft. McPherson, GA 30330  
ATTN: AFEN-CD

Ft. Monroe, VA 23651  
ATTN: ATEN-AD  
ATTN: ATEN-FE-US

Aberdeen Proving Ground, MD 21010  
ATTN: NGB-ARI-E

US Naval Oceanographic Office 39522  
ATTN: Library

Kirtland AFB, NM 87117  
ATTN: AFWL/NTE

Little Rock AFB 72099  
ATTN: 314/DEEE

Tinker AFB, OK 73145  
2854 ABG/DEEE

Building Research Board 20418

Dept. of Transportation  
Tallahassee, FL 32301

Dept. of Transportation Library 20590

Transportation Research Board 20418

Defense Technical Info. Center 22314  
ATTN: DDA (2)



END

DATED

FILM

8-88

Dtic